GALAXY SERIES

Operator's Manual

Arachnid INC®
The Originator of Electronic Darts

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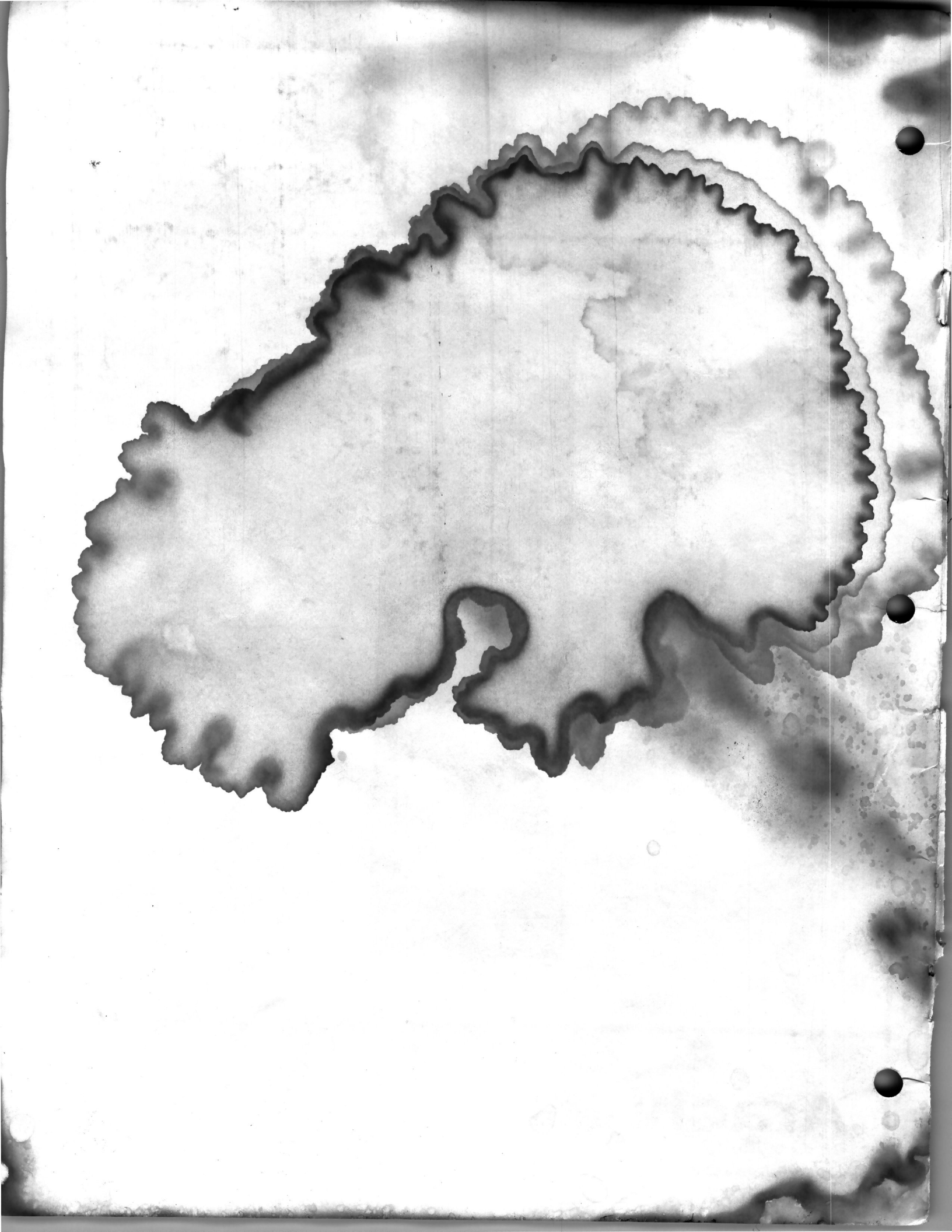

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This manual contains description, unpacking/assembly, operation and troubleshooting information for Arachnid Inc.'s English Mark Darts Galaxy Series dart game.

This manual will provide the user with basic installation and field service information. If you should encounter a problem that is not covered, or if you have any questions, call Arachnid, Inc. using our toll free number, 1-800-435-8319 from 8 a.m. to 5 p.m. CST.

SECTION 1
GENERAL DESCRIPTION

The Galaxy Series English Mark Darts machine is a patented microprocessor controlled dart game (patents 4057251, 4561660, 4793618, 4824121, other patents pending). It is a coin operated unit offering players a wide variety of game choices to challenge all skill levels. The more challenging or longer playing games require more credits per play. It will accumulate, store, and transfer dart league data and statistics. This information is kept in battery backed up memory, so a power failure will not cause the data to be lost. The unit occupies only 3.6 square feet (25 1/2" x 16") of floor space (see Figure 1).

The machine uses a sealed switch matrix scoring system behind the dart face. As the darts strike the target, the machine's computerized scoring system gives the players an instantaneous displayed score.

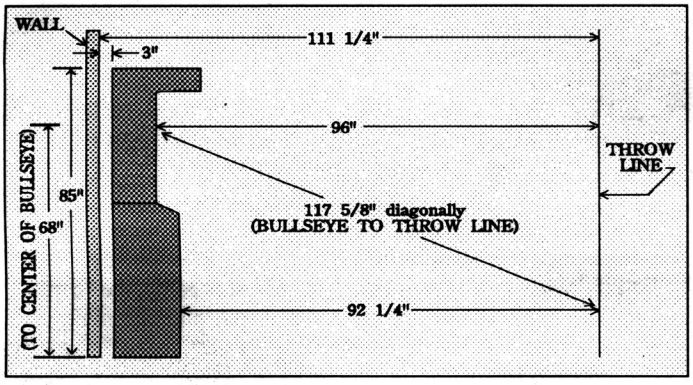


Figure 1: Side view of the Galaxy play field

SECTION 2
FEATURES OF THE GALAXY DART GAME

There are several features on the Galaxy Series game which make it unique from any other dart game that Arachnid, Inc. has ever built. These features are listed in this section.

NOTE: See Section 4.2 for information on how to select the options described in entries A thru E. All selections made are retained in battery backed memory, so they need only be set once.

2.1 UNIQUE FEATURES

A. AUTOMATIC PLAYER CHANGE

The Galaxy is now equipped with an Automatic Player Change, which is operator selectable in the Test/Setup mode. If this option is used, the game will change players automatically. The Remove and Throw darts delay time is also operator selectable.

B. NO DIP SWITCHES FOR NUMBER OF COINS PER CREDIT - ALL COINAGES ARE "SOFTWARE SELECTABLE"- FREE PLAY IS ALSO AVAILABLE

A selection of coins (1-20) can give 1 thru 20 credits. The number of coins-per-credit, credits-per-coin, meter clicks-per-coin, or free play is selectable through the Test/Setup mode.

C. CREDITS REQUIRED PER GAME IS NOW "SOFTWARE SELECTABLE" FOR EACH INDIVIDUAL GAME ON THE MENU

The number of credits required to play each game are preset at the factory, but can be changed as desired for any game, through the Test/Setup mode.

D. NO DIP SWITCHES FOR GAME OPTIONS - ALL FEATURES ARE "SOFTWARE SELECTABLE"

All selectable options are done through the Test/Setup Mode (Cricket 200, Double Bullseye, etc.)

E. SOUNDS FOR TRIPLE SCORES

If a triple that scores more than 50 points (T17,T18,T19,T20) is hit, the game plays a set of sounds during 301, 501, 701, and Count Up games. This option can be turned off in Test/Setup Mode if not desired.

F. TIC TAC DARTS - BEEPS THE SAME AS CRICKET ON DOUBLES AND TRIPLES (Three beeps for triples, two beeps for doubles).

This option can be turned on or off through the Test/Setup Mode.

G. TARGET LAMPS

Two standard 60 watt bulbs above the target head area provide illumination. Standard bulbs are readily available and more economical for the operator.

H. EXTERNAL VIDEO

A standard TV can be connected to the game to display the scores to large crowds at tournaments or to attract other players. See Section 5.3 for further instructions.

I. STUCK SEGMENT INDICATION

To immediately let a player know there is a problem, the number of the segment stuck will flash on the screen. He may then examine the darthead for broken tips or other foreign matter, or alert the bar owner that the game needs to be serviced.

J. REDESIGNED DARTHEAD IS CONTROLLED BY A SEPARATE MICROPROCESSOR (SMART TARGET)

This is a more efficient and reliable way of monitoring dart hits. The switch matrix has also been redesigned to allow for more versatility and easier troubleshooting. Segments are electrically isolated, and there is a single connector on the end—to minimize edge connection problems.

K. SPECIAL "THROW DARTS" SOUND

Tones play as the Throw Darts light comes on. This will help players be aware of when they can or cannot throw their darts.

L. MISSED DART DETECTOR
Arachnid's exclusive dart catching front, called the "Web", will now detect when a dart has hit it, and count it as a dart thrown, without giving a score.

M. THREE SPIDER WRITER SCREENS
More space for messages, advertising, league information, etc! (See Spider Writer page included in this manual for details.) Can also be programmed and transferred from game to game with the use of an "Operator Card". (See Section 4.3.E for details.)

N. SINGLE PLAYER AND LOW BALL CRICKET
NEW! Single player Cricket will allow players to practice individually and sharpen their playing skills. Lowball Cricket sharpens skills on the low numbers, and gives the game of Cricket exciting new strategies.

O. TOP GUN CHALLENGE
A competitive dart ladder which displays the top 10 players' names on the screen. Promotes dart play before and after leagues as the players try to work their way to the top of the ladder. See Section 2.2.H for more information.

P. LEAGUE SLOT™
A league money slot is provided so that league captains may deposit their money envelopes into the safety of the game cabinet for operators to collect later.

Q. NORMAL GAME PLAY STATISTICS
Displays the following statistics at the end of the game:

01 GAMES & COUNT-UP	CRICKET
6 DART OUT	8 DART OUT (IF DOUBLE
7 DART OUT	BULL IS ACTIVE)
8 DART OUT	9 DART OUT
9 DART OUT	# OF WHITE HORSES
3 IN A BED	5 MARK ROUND
# OF TON 80'S	6 MARK ROUND
# OF HIGH TONS	7 MARK ROUND
# OF LOW TONS	8 MARK ROUND
# OF HAT TRICKS	9 MARK ROUND
WINNER	# OF HAT TRICKS
POINTS PER ROUND	# OF WINS/ASSISTS
	# OF MARKS PER ROUND

R. LEAGUE MODE
Uses Team Card. (see Section 4.3)
Holds league data until a "Master" game asks for transfer or until collected with an Operator Card. (see Section 4.3.B)
Displays statistics at the end of the game the same as non league mode, with the addition of 4TH ROUND OUT and # OF PLAYER WINS per MATCH.

S. CRICKET & TIC TAC DARTS - NOW SHOWS NUMBER OF DARTS OUT ON SCREEN
Tic Tac Darts shows 6, 7, 8, 9 Darts out at end of game.
Cricket shows 8 and 9 Darts out at end of game
(An 8 Dart out is possible in Cricket if double bull is used).

2.2 THE GAMES: FAMILIAR CHOICES WITH NEW FEATURES

The new Galaxy Series game will play all the old favorite games, and includes some new variations. Coins needed per credit as well as credits needed per game are preset at the factory to standard settings, but they can be changed in the Test/Setup mode (See Section 4.2.). The games and their descriptions are listed below:

A. 301 OPEN IN/OPEN OUT - 20 ROUND MAXIMUM
A count-down game for one to four players where each player starts with 301 points. The first person to reach zero exactly or the lowest score after 20 rounds is the winner.

B. COUNT UP - 8 ROUNDS PER GAME
A 24 dart game for one to four players where each player tries to score the most points in 8 rounds (three darts per round).

C. TIC TAC DARTS - 20 ROUND MAXIMUM
A game for two players. Dart numbers will fill the squares at random (selected by the game) - the Bull is always in the center square. To mark an X or O a player must hit a number 4 times. Additional hits on a "closed" number will score points for that player. Singles score as 1 hit, doubles score as 2 hits, and triples score as 3 hits. The bull scores 1 hit each time. When one player gets three X's or three O's in a row, he wins. In the case of a tie or "cat" game where it is not possible to have three in a row, the high score wins.
New!! The game can be set up to beep on hits similar to cricket - 1 beep for singles, two beeps for doubles, three beeps for triples. See Section 4.2.F for details.

F. 301 DOUBLE IN/DOUBLE OUT - OR MASTERS OUT
35 ROUND MAXIMUM 20 ROUND MAXIMUM
These games are for more experienced players. One to four players, played the same as 301 except the player must lower their score (and end the game) by hitting a number in the outer "doubles" score ring, or by hitting the bullseye (inner bull if double bull is active). In the Masters game, the "triples" ring may also be used to end the game, and the maximum rounds of play are shortened to 20.

D. 501 TEAM DOUBLES, OPEN IN/OPEN OUT OR DOUBLE IN/DOUBLE OUT- 35 ROUND MAXIMUM
One to four players or teams, played the same as 301. This is usually played by two-person teams. The players select Open In/Open Out or Double In/Double Out.

E. 701 OPEN IN/DOUBLE OUT -
35 ROUND MAXIMUM
One to four teams or players, played the same as 301 except to go out a double or bullseye must be thrown (inner bull if double bull is active). Commonly played with 3 or 4 person teams.

G. CRICKET, ONE TO FOUR PLAYERS -
35 ROUND MAXIMUM (25 ROUNDS FOR LOW BALL)
The game of Cricket is played with the numbers 15 through 20 (except Low Ball) and the bullseye . Each player must hit a number three times before the number is "closed" by an opponent (except in single-player mode). Points scored by players may be governed by spread limits in some games (see the following game descriptions). Section 4.2.C describes how to activate the spread limits.

THERE ARE FOUR TYPES OF CRICKET GAMES TO CHOOSE FROM:

1. Original Cricket - one to four players. The highest or equal score with all the numbers closed wins. A 200 point spread limit can be activated for two or more players (Cricket 200). In the single player mode, it acts as a practice game. This is a new feature to our original game!

2. Cut-Throat Cricket - two to four players. Close a number and give points to your opponents. In this game, the lowest or equal score with all the numbers closed wins. There is no point spread limit option for Cut Throat Cricket.

3. Team Cricket - four players compete as two teams. Both teampartners must close a number before the team can score on that number. The highest or equal score with all the numbers closed wins. A 400 point spread limit can be activated for Team Cricket (Cricket 400).

4. Low Ball Cricket - played the same as original Cricket, with the following exceptions: a Bullseye scores 8 points (4 and 8 if the double bull is used), and a player can win the game by scoring a "Wicket" (closing the previously unmarked triple 1, 2, and 3 all in the same round). Low Ball Cricket uses a 20 point spread limit which cannot be deactivated.

H. TOP GUN CHALLENGE - FOR 301, 301 D.IN/D.OUT, OR ORIGINAL CRICKET

Be the best on the board with the Top Gun Challenge! Players select the game they wish to play, enter their name on the ladder if it is not already there, then challenge any one of three opponents above their name. The game is preset to a best out of 3 series, but the operator may change this to a best out of 5 or 7 series. Their name will appear under their score throughout the match; for game #1 the challenger will shoot first, after that, whoever loses a game will shoot first the next time. Individual statistics (as well as average scores for the first three rounds in 01 games) will be displayed after each game. If a challenger wins the match, that person's name will replace the opponent and vice versa on the ladder. If a player doesn't return to defend their position, their name will drop off the ladder after a number of days as specified by the operator in the Test/Setup mode. The ladder can also be modified in the Test/Setup mode.

I. DART LEAGUE PLAY

If the Automated League System is used during leagues, games should be selected through the League Play menu. Results of the match will then be retained in memory for collection with the Operator Card or by a Master game system. See Section 4.3 for more information on how this is done. **THERE ARE NO GAME ROUND LIMITS DURING LEAGUE PLAY. Statistics are displayed at the end of all games as described in Section 2.1.**

SECTION 3
UNPACKING/ASSEMBLY

3.1 UNPACKING

A. Using a sharp knife, cut the plastic bands.
B. Slide the top of the container straight up.
C. Remove the individual pieces from the cardboard base. The machine is now ready for assembly.

NOTE : The dart game has only two pieces to assemble, the bottom half and the top half.

Figure 2: Attaching Top Assembly to Base

3.2 ASSEMBLY

A. Lift the top half of the assembly up (two persons should do this, as in Figure 2), and set it on the bottom half.
B. Open the front hinged door and locate the four bolt holes at the bottom. Feed the four 1/4" hex cap bolts with washers into these holes and tighten them down to attach the top to the bottom. (Figure 3)
C. Feed the coin door harness connector up through the large hole to the left of the monitor. Attach it to the matching main harness connector as shown in Figure 4.
D. Attach Competitor Strip (if provided) directly above the coin door. A black triangular wood piece and wood screws are provided for this purpose. Position it behind the Competitor Strip and secure both to the game front using the wood screws.
E. Plug the power cord into a 110VAC (or proper line voltage for your country) GROUNDED wall outlet. The game is now ready to be powered up.

IMPORTANT : PROPER GROUNDING IS ESSENTIAL FOR THE MEMORY RETAINING FEATURES OF THIS GAME. THE WALL OUTLET USED MUST BE GROUNDED. HAVE IT CHECKED ELECTRICALLY FOR PROPER GROUNDING, EVEN IF IT DOES HAVE A THREE PRONG RECEPTACLE.

DO NOT CUT OR OTHERWISE ALTER THE POWER CORD PLUG ON THE GAME.

DO NOT USE AN EXTENSION CORD UNLESS IT IS THE HEAVY-DUTY GROUNDED TYPE.

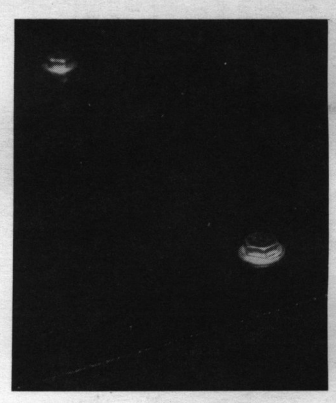


Figure 3: Hex Cap Bolt

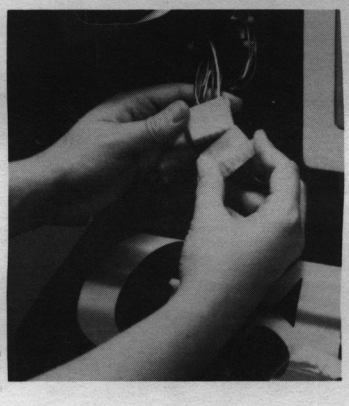


Figure 4: Harness Connection

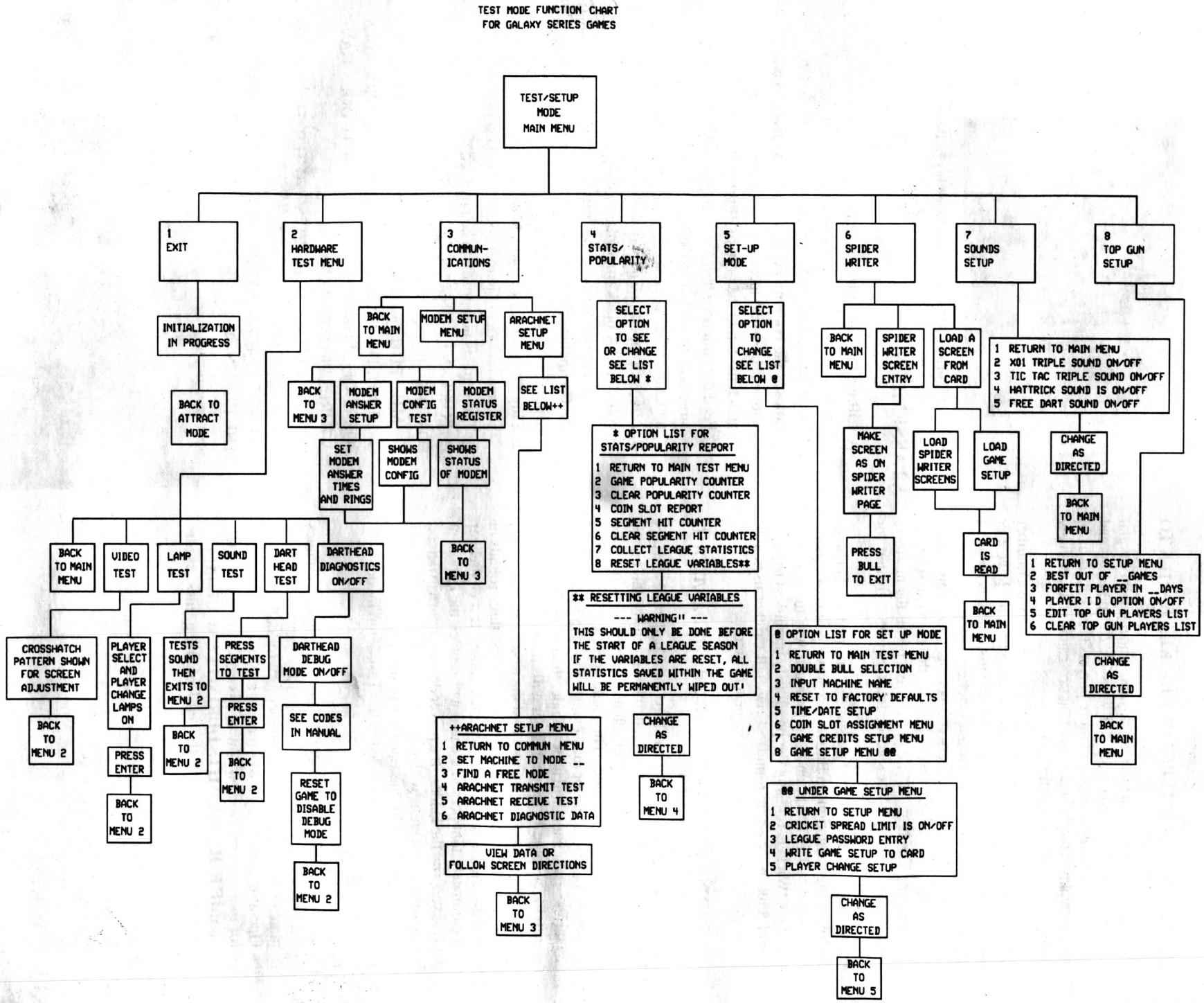


Figure 5: Test/Setup Mode Flowchart

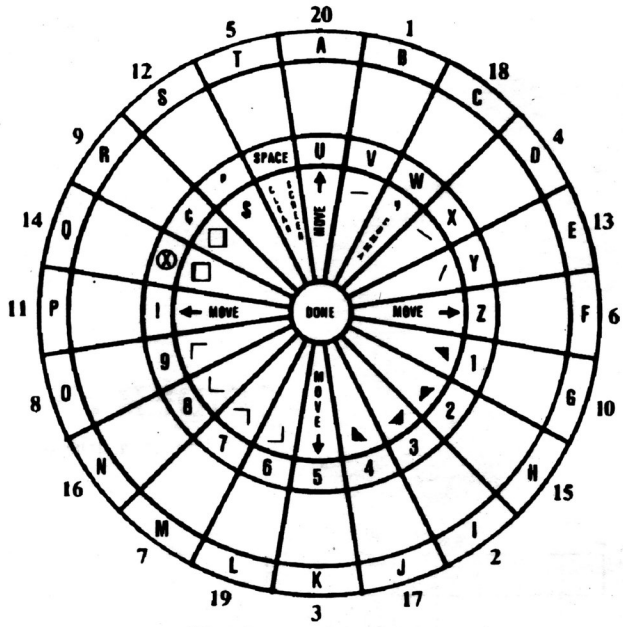
Arachnid Spider Writer

SPIDER WRITER INSTRUCTIONS: EASY AS 1 2 3 !

1. Put the game into Test/Setup mode by turning the game off, then back on, or by pressing the Reset button on the Main P.C. board. When the message "PRESS TEST SWITCH NOW"appears on the monitor, press and release the Test switch on tbe Main P.C. board. See Figure 6 on page 7 for the locations of these switches. A menu will appear on the screen; Option 6 says, "SPIDER WRITER". Select this option. The next menu has three options, "EXIT", "SPIDER WRITER SCREEN ENTRY", and "LOAD A SCREEN FROM CARD". (See the next section below for information on loading a screen from a card.) Select "SPIDER WRITER SCREEN ENTRY".

2. A "spider" cursor will appear on the top left corner of the screen. Use the darthead as a "keyboard" to move the cursor around and to enter the message or drawing desired. The diagram to the right illustrates which symbols are represented by segments in the single, double, and triple rings. **Please Note:** since the Galaxy darthead can differentiate between dart hits and finger touches, the segments must be pressed sharply and quickly for the characters to appear. This can be mastered with a little practice.

3. The Spider Writer feature now has three available screens for your custom text. Print your message on the first screen, then press Select to go to screen 2. When this screen is finished, press Select again to go to screen 3. If Select is continually pressed, the screens will scroll one after the other so you can view all of them. **Press the bullseye** when satisfied with the screen(s) created. If the bullseye is not pressed, or the darthead is not touched for ten minutes, the game will automatically exit the test mode, and any unfinished screens will be lost.



Keyboard Legend

Each Segment in the Singles, Doubles, and Triples rings correspond to the letter, number or graphic represented on the diagram above. Use "Move" segments to position the cursor on the screen. Be careful of the single 5 - it clears the screen completely.

HELPFUL HINTS:

Use the 32 x 16 grid on the back of this sheet to create the screen on paper before entering it in the game. It will save time in deciding where to place words or graphics. Make copies of this original and draw on the copies, saving the original to make additional copies.

Be careful of the Single 5! It clears the screen completely and should only be pressed when clearing or changing an entire screen.

See below for instructions on entering the Spider Writer screen(s) using an Operator card. This is a much more efficient way to do them, and screens can be saved on the cards and used to program several games with the same messages.

NOTE: A game that is not properly grounded may get strange characters in the Spider Writer screens due to static discharges from the players. If this happens, simply enter the Spider Writer mode and hit the Single 5 to clear the screen(s), or erase each bad character separately using the Triple 5 segment (to salvage an existing design). Hit the bullseye to exit. Please make sure the ground plug on the wall receptacle is properly connected. This will greatly minimize static that can cause "garbage" to foul the screen.

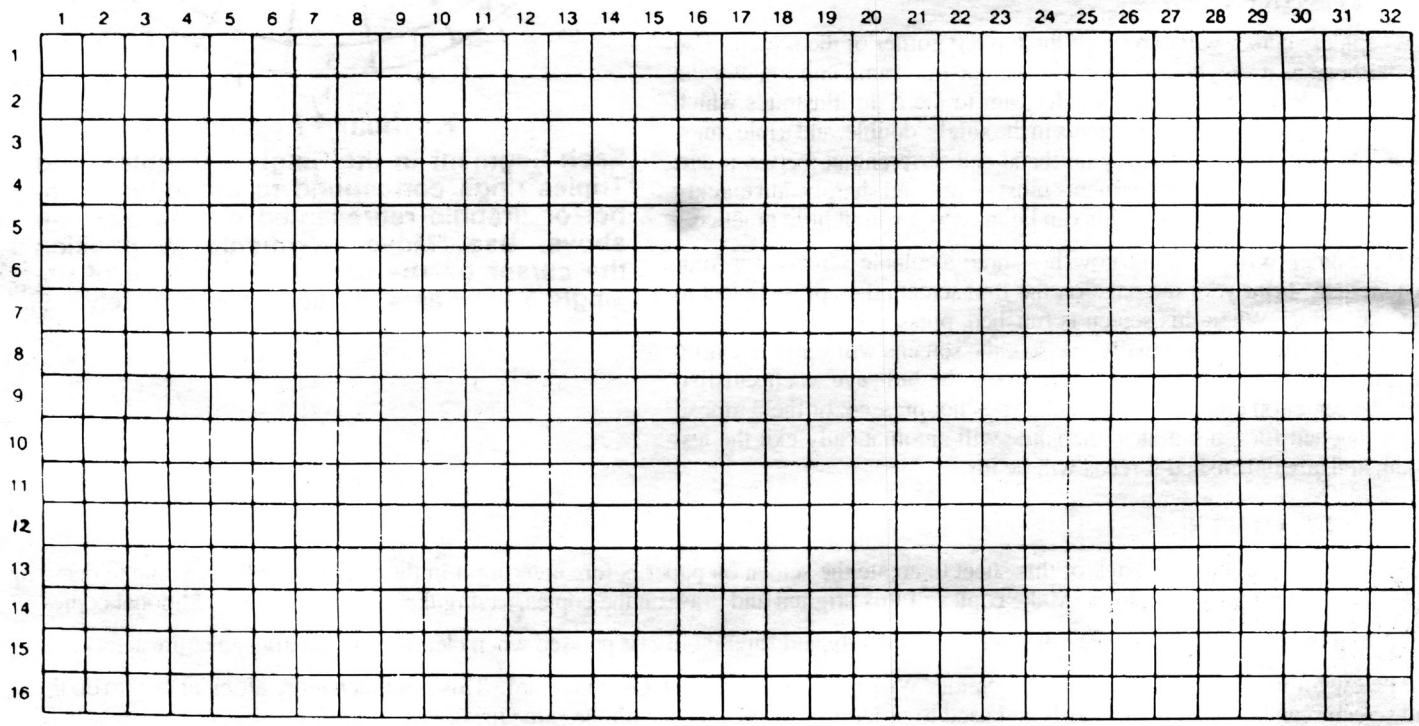
USING A "SPIDER WRITER CARD" TO MAKE SPIDER WRITER SCREENS

1. With the use of a Card Programmer Kit and an I.B.M. PC compatible computer, an operator can now make his Spider Writer screens ahead of time, save them on a Spider Writer Card, and quickly transfer them to his games! Follow the instructions included with the kit on how to program the cards. **(NOTE: "Spider Writer Cards"are made from Operator Cards-see Dartman II manual)**
2. The easiest way to load a Spider Writer card: Insert a programmed card into the slot on the front of the game at any time while the game is in its attract mode. Wait about 30 seconds, the game will automatically sense that the card is there. Select A:"Load Spider Writer Screens"; the game will record all the screens. Remove card and press <Enter> when prompted to return to normal operation.
3. Another way to read the cards is to enter the Spider Writer mode as described above. When the second menu is brought up, select "LOAD A SCREEN FROM CARD". Insert the card in the slot on the front of the game; the game will read the card, and load the screen(s) automatically. The program will then return to the menu, where the operator may remove the card and exit Spider Writer. **NOTE: The same card can be used on several games to write the same screens, and can be reprogrammed over and over on the computer to make new screens.**

SPIDER WRITER WORKSHEET

Use this grid to design your custom screen

Arachnid INC
The Originator of Electronic Darts
P.O. Box 2901
Rockford, IL 61132-2901
800-435-8319 (IL) 815-654-0212



SECTION 4
OPERATION

4.1 POWER UP, INITIAL SETUP, AND DIAGNOSTIC TESTS

A. Turn on the dart game using the on/off switch on the back of the machine. There is another switch located on the side. Make sure this switch is on also. It controls the target lamps, monitor, and internal receptacle only. It is used for automated league play. (See Section 4.3) After a few seconds, the monitor displays the Test/Setup mode screen (see Figure 7).

B. Immediately press and release the Test Switch located at the lower left corner of the Main P.C. board (see Figure 6) to put the game into Test/Setup mode. The screen will then show a selection menu that lists all the test and setup options available. This menu will hereafter be referred to as the Main Menu for the Test/Setup mode. Figure 5 is a chart which branches down to show what each option does. The screens themselves are easy to follow; select the test or setup option desired, and follow the screen directions. Refer to this chart as necessary to determine which option is needed to perform the test or function desired.

NOTE: The Test/Setup Mode switch will only work immediately after power up or after Reset is pushed, during the time that the Test screen is displayed—it will not operate at any other time. The Reset switch is located at the right/center of the Main P.C. board (see Figure 6).

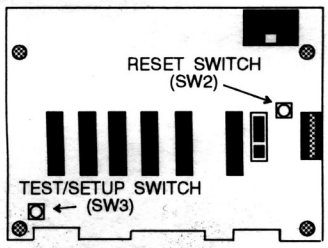


Figure 6
Test mode and Reset Switches

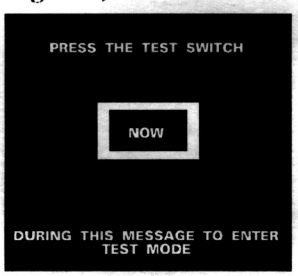


Figure 7:Depress Test Mode switch during this screen.

4.2 TEST/SETUP MODE AND REPORT SCREENS

All game options; various sounds, Cricket 200, Double Bull, and coinages/credits are now selectable through software via the Test/Setup mode. Figure 5 is a chart showing all the functions of the Test/Setup mode and where to access them. Below are descriptions of the various options available in the Test/Setup mode. Use the chart and these descriptions as references, and follow the instructions on the screen to make changes or move from one screen to another.

A. HARDWARE TESTS

There are five categories for hardware tests: Video Test, Lamp Test, Sound Test, Darthead Test, and Darthead Diagnostics. The first four are simple one-step tests, but Darthead Diagnostics is a feature in which the technician can define specific dart hits. Each darthead segment displays a number when hit that should match the ones listed in Tables 2A and 2B. If a number appears that does not correspond to the Table, the technician can determine which segment the number actually does correspond to, and use that information to troubleshoot the problem. **NOTE: The screen displays numbers from right to left. A stuck dart will first display the code number "0", then will display the code number for the segment that is stuck.**

B. COMMUNICATIONS

This section is for setting up Galaxy games to download statistics through a modem to a computer at the operator's location.

Modem Setup Menu - Set up answer times under the Modem Setup Menu, and check the network configuration of all games tied together in a location. See the Dartman II Manual for detailed information on setting up the Arachnet modem networks.

Arachnet™ Setup Menu - This section is for setting up a network of games, testing the network functions, and diagnosing information transmitting problems.

SET MACHINE TO NODE - gives each machine a unique node number in the network.

FIND A FREE NODE - is used to examine the entire network of games to find an unused node number, or determine which games are assigned to which number. This procedure also provides a functional test of the communications in both "Send" and "Receive" modes.

ARACHNET™ TRANSMIT TEST - tests the ability of the games in the network to transmit information to the modem game.

ARACHNET™ RECEIVE TEST - tests the ability of the game with the modem to receive information from the other games in the network.

ARACHNET™ DIAGNOSTIC DATA - is a window to the data transmitted from the games. It can be used to determine whether a game is transmitting good or bad information. This data should only be analyzed with the assistance of an Arachnid Service Technician. There are six fields that can be checked:

1. BAD PACKETS - This counts sets of information (called packets) that have been sent by a game which contained a flaw of some kind. This count will help indicate the overall accuracy of the game network.
2. CHBRCVERROR - This counts the number of characters (bits of information) transmitted from game to game which contained errors. This count can give an indication of the integrity of the communications system within a location. Electrical noise, poor wiring, other electronic phone equipment, etc. can cause these types of errors.
3. CHARCVERROR - This counts the number of characters transmitted from the modem which contained errors. A bad modem, or a modem which is making a bad connection on the Main Board or to the cables could cause these types of errors.
4. PKTCOUNTER - This counts all "packets" (defined above) transferred on the network. This can be used to determine how many times the network is called, to analyze failure rates.
5. TOTALRETRIES - The ARACHNET™ will retry sending information from game to game if not sent properly the first time. This counter keeps a record of these retries.
6. STATE - This displays variables which are useful by Arachnid in monitoring the internal state of the system.

Table 2A: Darthead Debug Mode Codes listed in numerical order

SEGMENT NUMBER	INNER	TRIPLE	OUTER	DOUBLE
1	40	39	38	37
2	12	11	10	9
3	4	3	2	1
4	32	31	30	29
5	48	47	46	45
6	24	23	22	21
7	76	75	74	73
8	68	67	66	65
9	56	55	54	53
10	20	19	18	17
11	64	63	62	61
12	52	51	50	49
13	28	27	26	25
14	60	59	58	57
15	16	15	14	13
16	72	71	70	69
17	8	7	6	5
18	36	35	34	33
19	80	79	78	77
20	44	43	42	41

BULL	INNER	82
BULL	OUTER	81
FINGER TOUCH		97
MISSED DART		96
STUCK DART		0

Table 2B: Darthead Debug Mode Codes listed in the order they appear on the darthead (counterclockwise from bottom)

DOUBLE	OUTER	TRIPLE	INNER	SEGMENT NUMBER
1	2	3	4	3
5	6	7	8	17
9	10	11	12	2
13	14	15	16	15
17	18	19	20	10
21	22	23	24	6
25	26	27	28	13
29	30	31	32	4
33	34	35	36	18
37	38	39	40	1
41	42	43	44	20
45	46	47	48	5
49	50	51	52	12
53	54	55	56	9
57	58	59	60	14
61	62	63	64	11
65	66	67	68	8
69	70	71	72	16
73	74	75	76	7
77	78	79	80	19

BULL	INNER	82
BULL	OUTER	81
FINGER TOUCH		97
MISSED DART		96
STUCK DART		0

C. STATS/POPULARITY

This section contains counters which indicate total times games have been played, total number of coins inserted, and how often segments are hit. All counters can be cleared (except coin counters). Stats/Popularity also contains a field where league statistics can be collected (though this is usually done while the game is in "attract" mode), and a function which clears all old league statistics from memory. This latter field is called "Reset League Variables".

League Variables should only be reset prior to the start of a new league season, or when new EPROMS or RAM chips are installed in the game. Always make sure that league stats are collected from the game before resetting , as they will be permanently erased from the game's memory.

D. SET-UP MODE

Options accessed under this section are Double Bull, setting the machine name and the time/date (for stats collection purposes), setting up the game for factory defaults, assigning coin slot credits and game credits, setting the Cricket spread limit, the league password and Auto Player change setup. This section is also the area where the game setup can be written to a Spider Writer card. These options are described below:

Double Bullseye - To choose between a single, 50 point bullseye and a double, 25/50 point bullseye for each game. The double bullseye can be made player selectable for any game. **IMPORTANT: If the Double Bullseye is chosen, the double bull segment must be installed in the darthead. Either the solid or double segment may be used with the single bullseye setting. To change the segment, see Section 5.8 (Dart Head Disassembly Instructions).**

Input Machine Name - Each game must have a separate name for keeping track of stats collected.

Reset to Factory Defaults - these defaults are the factory recommended settings for all functions. Operators can customize each selection to their liking, but this provides a base to start from.

Time/Date Setup - must be set correctly for modem collection to take place properly, and for Top Gun maintenance.

Selection of Coinage and # of Credits - The screen will display the factory setup for your country (U.S.A. = 1 coin/1 credit). To change the preset setup, select COIN SLOT ASSIGNMENT MENU and follow the screen prompts closely (see Figure 8A). It will provide the means to select # of coins per # of credits for up to three coin slots (slots one, two, and three -slot three is for use with a bill acceptor). The Select button is always used to increment the number, the Test button resets the number to one, and the Enter button advances to the next screen. The game can also be set for **FREE PLAY**.

Selecting the # of Credits required for each game - This is preset at the factory, but can be changed in the Setup Mode. Go into the GAME CREDITS SETUP MENU, and follow the screen directions (see Figure 8B). It operates the same as Selection of Coinage above.

Figure 8A

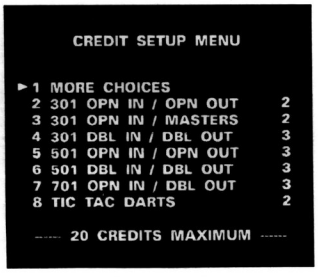


Figure 8B

Coin/Meter Assignment - A mechanical counter is located inside the coin door. It counts the # of credits given in all three coin slots, from which the total amount of cash collected can be determined. The Coin/Meter Assignment option allows the operator to assign how many coin meter clicks are registered when a coin has been dropped (to aid in counting total money collected). For most applications, this is normally set to 1.00 which would cause the meter to count once for each coin. An electronic counter is also provided under Option 4 which counts actual coins (or bills) run through each slot.

Cricket Spread Limit - This option prevents one player from scoring more than a given number of points over his opponent's score (regular Cricket = 200 points; Team Cricket = 400 points; Low Ball Cricket = 20 points). This helps prevent players from using Cricket for practice by not closing all the numbers and rolling over the score. The Low Ball Cricket spread limit will not be turned off when this option is deactivated.

League Password Entry - This is a safeguard for collecting league stats. If the password on the game does not match the password on the Operator Cards or modem settings, stats cannot be collected.

Write Game Setup to Card - For writing all of the Test/Setup mode settings to a Spider Writer Card. See next section for more information.

Player Change Setup - This option is where automatic player change is activated.

E. SPIDER WRITER MODE

Select Option 6 on the Main Menu. There will be a blinking "Spider Cursor" in the top left-hand corner of the screen. See the Spider Writer page included in this manual for details on using this feature.

F. SOUNDS SETUP

Triple Sounds for the "01" games and Count Up - When enabled, the game will emit a sound whenever a triple segment is hit.

Hit Sounds for Tic Tac Darts - This option will allow the game to produce a sound whenever a correct number is thrown in Tic Tac Darts. If a double is hit, it will sound twice, if a triple is hit, it will sound three times; similar to marks in Cricket.

Hat Trick Sound - the game will emit a sound whenever a hat trick is thrown.

Free Dart Sound - causes the game to emit a sound whenever a dart is thrown at the board if no coins have been inserted.

G. TOP GUN SETUP

Top Gun Editing - In the Setup mode, the Top Gun players list can be edited (see Figure 8C). Names can be added or deleted as desired. The operator can also select the number of games per match that Top Gun will play: best out of 3, 5, or 7, and the length of time that a player's name will be retained on the Top Gun list if they are not challenged (1 thru 99 days).

All screen options listed in this section will be retained when the power is turned off. Turning the power off and on will always cancel any mode the game is in. Otherwise, follow these written instructions or screen instructions to change modes or exit.

Figure 8C

4.3 USING THE NEW LEAGUE PLAY MODE AND TEAM/OPERATOR CARDS

NOTE: The League Master package with Dartman II must be purchased in order to use this feature. It is a software package designed to provide faster, more efficient league management than anything else currently on the market. Contact your distributor or Arachnid, Inc. for details on the purchase and use of this package.

A. LEAGUE TEAM CARDS

The Team Card is a new method of recording and storing scores and statistics for the players on league night. The Galaxy game will store all types of league information: games played, player order, wins, and all feats achieved by each player. The team captain inserts the card at the start of the match, and the game does the rest. The players will no longer have to fill in score sheets. All they have to do is play darts. Simply select league play on the game menu, and follow the instructions on the screen for inserting the card. After the match, the operator will retrieve the night's scores and feats as described in Section 4.3.C.

The cards are capable of keeping records of the following:

1. Names of up to four team members and four substitutes
2. Nicknames for all players
3. Number of games being played
4. Type of games being played
5. Shooting order of players for up to 30 matches

B. LEAGUE OPERATOR CARDS

Another tool designed for use with the Galaxy game is the Operator Card. It can be used for the following:

1. Collecting league statistics as described in Section 4.3.C They can also be collected via telephone lines through a Master game...see Section 4.3.D.
2. Calculating S.P.R.E. (Spot & Player Ranking Evaluation) and/or Points per Round averages for player ranking, and keeping track of all feats.

C: COLLECTING LEAGUE DATA WITH THE OPERATOR CARD

To collect the league data, the operator transfers the data from the game to the Operator Card by inserting the card into the game during the attract mode, and following the screen directions. Then he takes the cards back to his home office, inserts them into the player card programmer box attached to his computer, and weekly league statistics are automatically compiled from the card information. No more manual entering of nightly stats, no more room for error. Many other reports can also be generated from the information collected on the cards, such as player feats, S.P.R.E. and/or points per round ranking, team statistics, etc. Additional technical information is provided with the purchase of a League Master system.

D: COLLECTING LEAGUE STATISTICS THROUGH PHONE LINES WITH THE MODEM

If a location has set up one of its games to be a "Master" (see Section 5.2.G for details on how this is done) league information can be transferred through phone lines from the other games at that location to the Master, and then to an IBM AT (or compatible) at the league operator's location. The statistics collected from the Operator Cards, or transferred from the Master game, can be used in conjunction with our League Master package and Dartman II. Please refer to Arachnid's Dartman II Manual for the League Master system for more information on running leagues using this software, the Team/Operator cards, and other league capabilities of the new Galaxy Series dart games.

NOTE: The operator should use the on/off switch on the side of the game at the end of the night if modem collection is used. This way, power is still available for the modem to operate during the night.

E: USING PREPROGRAMMED CARDS TO TRANSFER SPIDER WRITER SCREENS AND TEST/SETUP MODE INFORMATION

This can be done without using the complete League Master System but it does require the purchase of the Dartman II League Master System with the STAT Card Programmer Kit and an IBM P.C. compatible computer. The Dartman II Manual will provide instructions on how to program Spider Writer cards and use them with the game. The Spider Writer page included in this manual also contains information on using the card with the Galaxy game.

SETUP CARDS are made from Spider writer cards. One card can hold 3 full Spider Writer screens along with all setup information, if this is desired.

PROGRAMMING A SETUP CARD - Take a Spider Writer card to a Galaxy game. Program all game setup features as desired on the dart game, then go back to the Setup Mode main menu (option 5). Insert the card into the Card Slot on the front of the game. Select "GAME SETUP MENU", then select "WRITE GAME SETUP TO CARD". The entire setup procedure will be transferred to the card.

To use the programmed card in another Galaxy game, insert the card into the new game during its "Attract Mode". After a few moments, a menu will appear. Select "LOAD GAME SETUP". The setup information will transfer to the new game in just a few seconds.

SECTION 5
TECHNICAL DESCRIPTION

5.1 GENERAL INFORMATION

Figure 9 and Figure 10 show the main components of the game:

A) Lamp/Outlet Switch
B) Lamp Fuse
C) Main P.C. Board
D) Power Supply
E) 12" Monitor
F) "Smart Target"Darthead Interface
G) Darthead Assembly

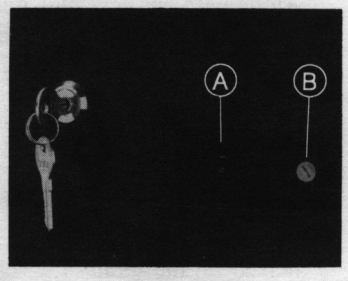


Figure 9

The new design of the Galaxy Series dart game allows it to be serviced totally from the front. All major game components are accessed by unlocking the front panel and swinging it open. The darthead is completely exposed, and easily removable. Unscrew the four thumb-nuts that hold it in place, and slide the assembly out for service. The Main Board and Power Supply are easily accessable. The target lamps provide light for servicing, and there is an outlet inside the cabinet for meters, soldering irons, etc. (120 VAC, 4 amps max.) This outlet is fused seperately from the rest of the game. The monitor is plugged into this outlet. The side switch (figure 9) controls the target lamps and service outlet. With this switch, the operator can power down the game without removing power from the main board of the game. This is important for automated league play. (see Section 4.3)

Figure 10

5.2 MAIN P.C. BOARD

The Main P.C. board (Figure 20) is controlled by a 6809 (U9) microprocessor and associated IC's consisting of:

TMS4416 (71C464) 16Kx4 Dynamic Memory(2) - U6, U7
TMS9118 Video Generator - U5
DS1244 Battery Backed up RAM w/Clock - U12
27C010 128K EPROM - U10
8749 Target Scan Microprocessor - U14
SCN2681 Dual Asynchronous Receiver/Transmitter - U20
74LS04 Hex Inverter - U18
74LS74 Dual D Flip Flop - U8
74LS244 Octal Buffer - U13
74LS245 Tri-State Bus Transceiver - U27
74LS541 Octal Buffer - U28, U29
556 Dual Timer - U3
6821 Peripheral Interface Adapter(3) - U11, U15, U17
75176 Bus Transceiver - U24
1990C.JED 20V8 GAL - U16
LM383T Audio Amplifier - U4
ULN2003 Transistor Network(3) - U1, U2, U19
MAX4391 +12V to -12V Converter for Modem - U25
MC1488 +5V to +/-12V RS232 Modem Driver - U23
MC1489 +/-12V to +5V RS232 Modem Receiver - U21, U22
MM2400 Optional Modem - U26

A: RESET CIRCUIT

The microprocessor can be reset either by shutting off power for a few seconds and then turning the game back on, or by activating the reset switch on the main P.C. Board. The reset switch retriggers the 556 timer (U3). When the switch is closed, the reset line goes low. C9 is used to prevent electrical noise from triggering a reset.

B: PLAYER CHANGE AND SELECT CIRCUITS

The Player Change/Enter and Select push buttons are located on the front slanted panel. When the Player Change/Enter button is closed, it grounds pin 3 of U11. When Select is closed, it grounds pin 2 of U11. When the switches are open, the inputs are held high.

NOTE: Use only type GE658 lamps in these pushbuttons. Use of any other lamp type may cause excessive heat buildup inside the switch housing which may cause the plastic housing to stretch, and keep the switch from closing completely.

C: SOUND CIRCUIT

Sound is generated through the 6821 (U17) and governed by the main program by sending out a digital sound signal when required for each of the sounds that the game makes. The sound is output at pin 19 and is fed through the volume control potentiometer R9, accessed from the top of the P.C. board. U4 (LM383T) is an 8 watt audio power amplifier whose gain is controlled by the ratio of R20 and R21. The voltage for U4 is +12VDC from the power supply.

D: INTERRUPTS

The microprocessor is interrupted by the coin switches (except during Test/Setup mode). Other interrupts are the ten minute time-out feature and reset switch. When activated in either way, the game resets as if it was just turned on. With the ten minute time-out, any activity prior to the interrupt will reset the timer back to ten minutes. (Example: If a game is started, and then left unattended for ten minutes, it will automatically return to its attract mode, ending the previous game and the credits used to start that game. Any extra credits will still be available for use. If the game is played within that ten minute span, the timer starts over at ten minutes from the time the activity was detected.)

E: MEMORY

The 27C010 EPROM (U10) contains the main program. The window on this IC should always be covered with our adhesive label as EPROMs are erasable when exposed to ultraviolet light for a period of time. The RAM in this system is a DS1244 (U12) with internal lithium batteries. It contains 64K of memory. The batteries provide data retention when power is off for the popularity screen, option setups, and league statistics (see section 4.2). The 8749 (U14) receives serial data from the Smart Target board, and interrupts the microprocessor. See Section 5.4 for further information on this part of the system.

F: ADDRESS DECODING

Address decoding is done with U16, a programmed GAL (GAL20V8).

This IC determines whether the microprocessor is addressing memory, one of the Peripheral Interface Adapters, or the video IC.

G: OPTIONAL MODEM FEATURE

A modem that plugs directly into the Main P.C.Board (MM2400, U26) is available for use with the Galaxy Series game. It is used in conjunction with the League Master System and Dartman II, for automated league management. The modem will convert any Galaxy game into a "Master" game. The Master game, when connected to other Galaxy games at a given location, will be able to transfer league statistics directly to an IBM or compatible computer at the league operator's home location. The modem is an MM2400 (with special reset capabilities) 2400 baud, available in a kit from Arachnid. It requires a -12VDC supply, which is provided by U25 (MAX4391), which converts the +12V to -12V. The modem is commanded by U23 (SCN2681) through an MC1488 (RS232 Driver). Modem signals are received and converted by U21 and U22, (RS232 Receivers). For additional information on installation and use, consult the Dartman II manual.

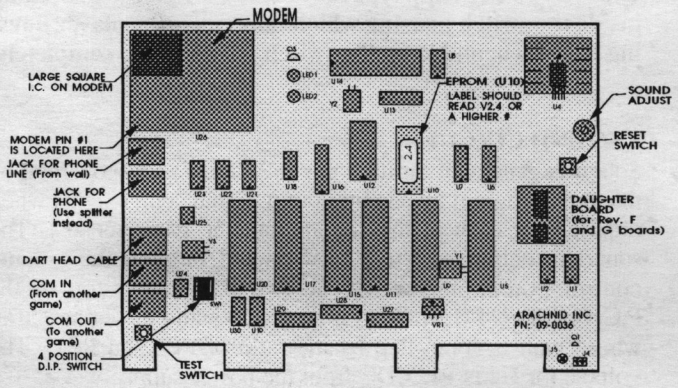


Figure 11: Main P.C. Board with modem installed

5.3 VIDEO AND MONITOR

The video signal is generated by a TMS9118 (U5), which also provides the clock signal for the timing circuit, through a 10.738635 MHz crystal (Y1). The TMS9118 internally divides the crystal signal by three, so that a separate crystal is not necessary to run the rest of the system. Two TMS4416's (U6, U7) provide memory for the video section. The output signal is generated on pin 36 of the TMS9118, and is buffered by Q1 for chip protection.

There is one RCA style phono jack on the main board (see Figure 20, item 66) which is used for the internal monitor. If a second external TV or monitor is desired, this line can be split with a "Y" splitter. If a monitor is used, it must have a composite video output. If a TV is used, a coaxial cable must be run from the RCA splitter to an RF modulator or the video input of a VCR. The output of the modulator or the VCR is usually on channel 3 or 4 and should be connected appropriately to the TV. This arrangement can be useful for displaying matches at tournaments or to create added interest at a location.

SEE THE MONITOR MANUAL INCLUDED IN THE ACCESSORY KIT FOR DETAILS ON MONITOR OPERATION, ADJUSTMENTS, AND TROUBLESHOOTING INFORMATION.

5.4 "SMART TARGET" INTERFACE BOARD

Along with our new switch matrix design, we also have a new target interface P.C. board called the "Smart Target" interface. It contains its own 8749 microprocessor, which is used to continuously scan the darthead. Since this IC is totally dedicated to the darthead, hits should not be missed and feathering will be minimized, thus making game scoring more accurate. When a hit is detected, the score is sent serially to the 8749 (U14) on the main board. This 8749 then interrupts the 6809 (main program IC, U9) which transfers the score to be displayed on the monitor. The "Smart Target" interface board reads the 19 conductors from the switch matrix and transfers it serially to the main board. For troubleshooting purposes it is important to know which pins on the target interface board will give a particular score. This information is listed in Table 1 and shown in Figure 13. With the game in Test/Setup mode (go into Hardware Test, then Darthead Test) or in game mode, pairs of pins can be shorted and opened with a jumper to simulate a dart hit (see Figure 12). This procedure can help determine whether a scoring problem is in the switch matrix or the game electronics.

NOTE: THE SCORE WILL NOT REGISTER UNTIL THE JUMPER WIRE IS REMOVED FROM ONE OF THE PINS.

If a game has a stuck segment, it can be opened electrically by disconnecting the 19 pin ribbon. The stuck segment's score will then register, and you can check the darthead for the cause of the problem.

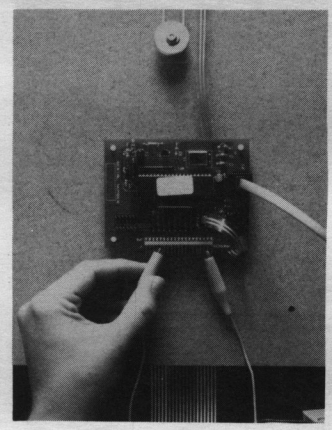


Figure 12

Table 1

SWITCH MATRIX TEST CHART

IS = INNER SINGLE
OS = OUTER SINGLE
D = DOUBLE
T = TRIPLE
IB = INNER BULL
OB = OUTER BULL

To test, remove the switch matrix lead from JP8. Short two pins together and release. The LED should flash and the game should score as if the segment was hit.

JP8 PIN #	13	12	11	10	9	8	7	6
1	D11	OS11	T11	IS11	D10	OS10	T10	IS10
2	D8	OS8	T8	IS8	D15	OS15	T15	IS15
3	D16	OS16	T16	IS16	D2	OS2	T2	IS2
4	D7	OS7	T7	IS7	D17	OS17	T17	IS17
5	D19	OS19	T19	IS19	D3	OS3	T3	IS3
14	XXX	XXX	OB25	IB50	XXX	XXX	XXX	XXX
15	D14	OS14	T14	IS14	D13	OS13	T13	IS13
16	D9	OS9	T9	IS9	D4	OS4	T4	IS4
17	D12	OS12	T12	IS12	D18	OS18	T18	IS18
18	D5	OS5	T5	IS5	D6	OS6	T6	IS6
19	D20	OS20	T20	IS20	D1	OS1	T1	IS1

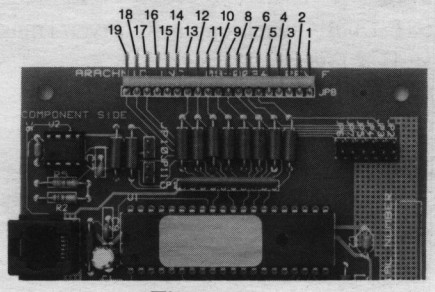


Figure 13

5.5 TARGET ILLUMINATION

The target on a standard Galaxy cabinet (not conversion kits) is illuminated by two standard 60 watt bulbs mounted in reflecting boxes above the darthead. They are illuminated to 2/3 their normal intensity during game play by means of a fixed resistor mounted on the power supply bottom board. This cuts down glare on the darthead and will lengthen the life of the bulbs. During the attract mode, the intensity of these bulbs can be adjusted down further to discourage free play. This is done by means of a potentiometer mounted on the front of the power supply chassis. Allowing the bulbs to burn at all times instead of turning them on and off will also lengthen their life.

5.6 POWER SUPPLY

The power supply accepts normal line voltage on the primary side of its transformer, and has a secondary output of 15VAC. The AC output is then rectified to DC, and regulated down to usable voltages. It is regulated into two outputs, one 5VDC output (by an LM323 voltage regulator), and one 12VDC output (by an LM340-12 voltage regulator). The regulated voltages should be +/- .1V. If the 5VDC line falls below 4.8VDC, the logic may not operate properly, as some chips may fail to function.

Foreign power supplies which require other than 110VAC line voltage are equipped with a dual transformer which has a 110VAC tap. This way, 110V is available (on the bottom board of the supply) to power the target lamps, monitor, etc. (this does not apply to some conversion kits) There are two fuses on the power supply. The main fuse is located on the chassis. It is a 2.0 amp 250V slow blow (3AG size).

Nothing will function if this fuse blows. The other fuse is located on the small P.C. board on top of the power supply. It is a 5.0 amp 250V slow blow (3AG size). This protects the 5V and 12V circuits.

NOTE: THE GROUND ON THIS GAME IS FLOATING AND MUST NOT BE CONNECTED TO THE POWER SUPPLY CHASSIS GROUND. THEREFORE, ALL VOLTAGE MEASUREMENTS SHOULD BE REFERENCED TO THE GROUND ON THE SMALL P.C. BOARD ON TOP OF THE POWER SUPPLY OR GROUND ON THE MAIN BOARD.

5.7 DARTHEAD

The Galaxy darthead assembly is somewhat different from Arachnid's previous assemblies. The darthead is removable from the front of the game by means of a hinged front door. A single 19 pin ribbon brings the signals to the "Smart Target" interface board, which in turn transmits the signals to the Main Board through a 6 conductor phone cable . Two long screws hold the darthead assembly together. It is mounted to the game by 4 screws behind the dart catcher (web).

5.8 DARTHEAD DISASSEMBLY/REASSEMBLY

To clean or replace parts in the darthead, first disconnect the modular connector from the "Smart Target" P.C. board. Then remove the entire assembly by removing the four "thumb nuts" that hold it in place, and gently pulling it off the game front. Lay the darthead face down, and remove the two screws that hold the assembly together. Now, disassemble and assemble the darthead as follows (also see Figures 14 and 15):

a) Gently lift off the wood target back.
b) Lift off the switch matrix, and then lift off the Matrix Cushion, to expose the segments.
c) Check for dirt and broken tips or other foreign matter between the spider, segments, matrix and cushion, etc.
d) Replace any worn or broken segments.
Replace single or double bullseye at this time if desired.
e) Clean the Matrix Cushion and set it back on the spider. (See note below)

IMPORTANT: THERE SHOULD BE A SMALL "U" SHAPED CUTOUT ON THIS CUSHION. POSITION IT IN LINE WITH THE INDENTED CIRCLE ON THE SPIDER TO THE LEFT OF THE LOCATING HOLE AS SHOWN IN FIGURE 15. THE SWITCH MATRIX ALSO HAS A CUTOUT IN A SIMILAR LOCATION.

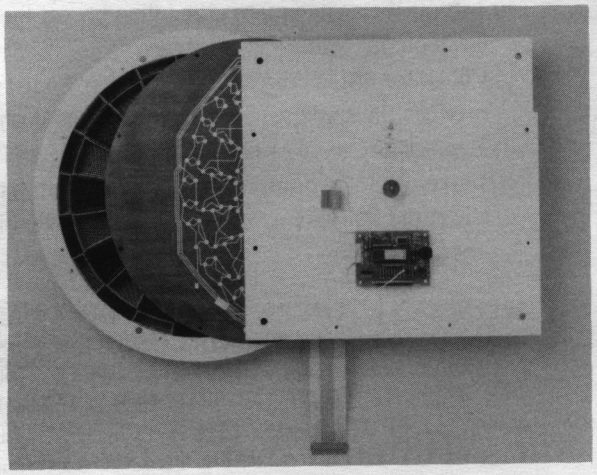
f) Place the switch matrix with the tail on the bottom, lining up its U shaped cutout near the one on the Matrix Cushion.
g) Reinstall the two screws that hold the matrix assembly to the wood back, and position the assembly on the four screws in the game front so that the tails face down and the locating hole is on top.
h) Double check the positioning of the darthead and tighten the four thumb nuts to hold everything in place.

NOTE: TIGHTEN THE FOUR NUTS SO THEY ARE SNUG. DO NOT OVERTIGHTEN.

NOTE: IT IS IMPORTANT TO KEEP DIRT OUT OF THE AREA BETWEEN THE SPIDER AND SEGMENTS AS THIS CAN CAUSE NON-SCORING OR IMPROPER SCORING. ON A HEAVILY PLAYED GAME IT IS A GOOD IDEA TO DO PREVENTATIVE MAINTENANCE ON A REGULAR BASIS IN THE FORM OF DISASSEMBLING THE DART HEAD, CLEANING, AND REASSEMBLING. THIS CAN HELP PREVENT SERVICE CALLS BETWEEN REGULAR VISITS.

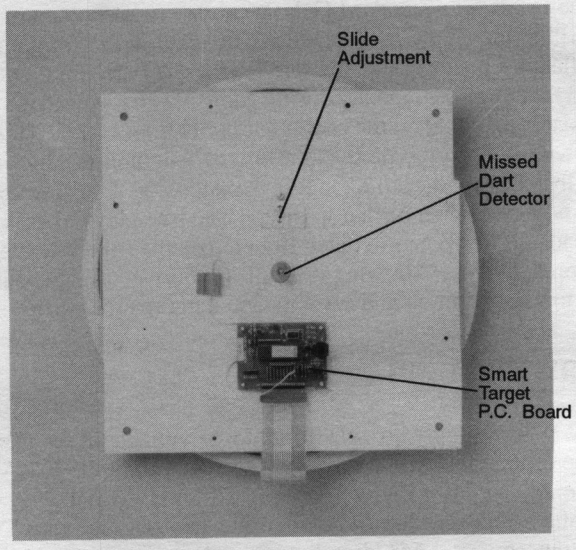
5.9 ARACHNID WEB AND MISSED DART DETECTOR

The Web (or dart catcher) will "snag" darts that miss the target, and it now has the ability to detect when a dart has hit it by means of an impact sensitive switch mounted behind the darthead (See Figure 16). The connector for the switch plugs into the Smart Target board, and operates similar to the switch matrix switches. It will detect a hit anywhere on the Web face, and the game will record it as a dart thrown, with no score given. This will cause the Player Change switch to light after 3 darts are thrown, no matter where they land on the board. There is a sensitivity adjustment located on the neck of the assembly. Sliding it down will decrease the Missed Dart Detector's sensitivity, sliding it up will increase it. Adjust as needed for each location's needs. **NOTE: Be careful not to bend or kink the plastic suspension bands when making adjustments. This could cause the Missed Dart Detector to operate improperly.**



View of all Darthead Layers

Figure 14



Complete Assembly From Back

Figure 16

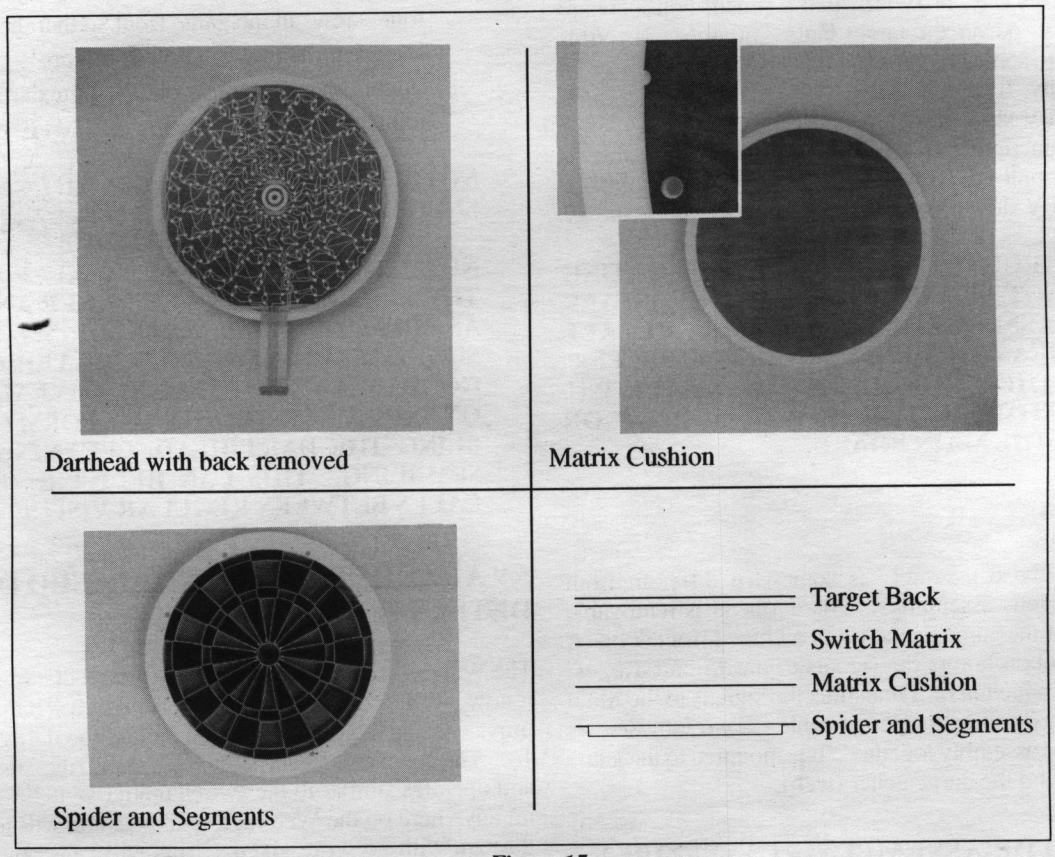


Figure 15

SECTION 6
PARTS LISTING

"SMART TARGET" INTERFACE BOARD
24798

FIG.#	ITEM #	PART#	DESCRIPTION
17	1	26984	IC,8749,PROGRAMMED
17	2	13653	IC,75176B, 8 PIN BUS TRANS.(2)
17	3	12551	RESISTOR,330 OHM,1/4W
17	4	21440	RESISTOR,5.6K OHM,1/4W
17	5	23660	RESISTOR,18K OHM,1/4W
17	6	32555	RESISTOR,47 OHM,1/4W
17	7	26992	RESISTOR,3.3K OHM,1/4W
17	8	15887	RESISTOR NET,SIP,3.3K X 9
17	9	34777	CAPACITOR,10MFD,50V
17	10	13671	CAPACITOR,100PF,25V,MONOLYTHIC (3)
17	11	19121	CAPACITOR,1MFD,25V,AXIAL,TANTALUM
17	12	32561	CAPACITOR,.1MF,200V
17	13	13673	CAPACITOR,5PF,200V,AXIAL,CERAMIC
17	14	15893	CAPACITOR,22PF,200V,AXIAL,CERAMIC
17	15	27002	CAPACITOR NET,SIP, 100PF X 9, 50V
17	16	21458	CRYSTAL,4 MHZ
17	17	35574	CONNECTOR,MODULAR,6 PIN,RJ-11
17	18	24808	HEADER,19 PIN,.100 SPACING
17	19	29148	HEADER,.1 X 12 DUAL ROW
17	20	17031	LED,RED,AEG TIL 220
17	21	23842	TRANSISTOR,2N4402
17	22	30523	FERRITE,BEAD ON A LEAD (12) Z = 120 OHMS X 100MHZ

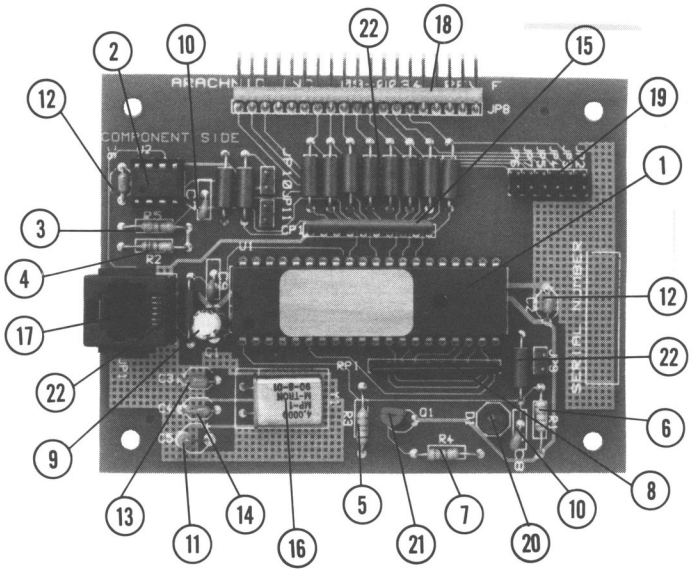


Figure 17

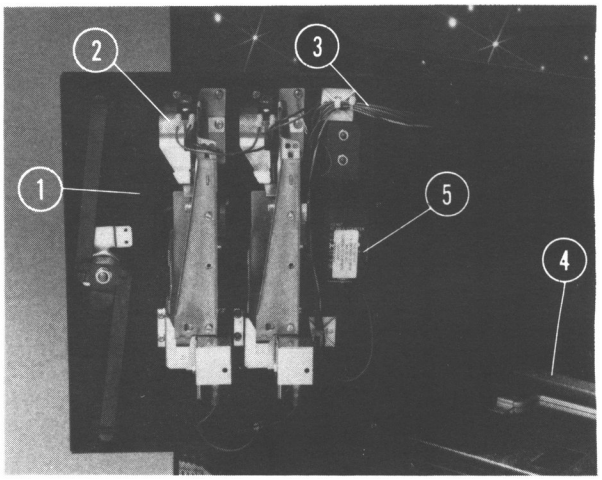


Figure 18

COIN DOOR ASSEMBLIES
21406

FIG.#	ITEM #	PART #	DESCRIPTION
18	1	28268	COIN DOOR, GALAXY, USA
18	2	19131	SWITCH,PUSH BUTTON (2)
18	2	34811	BULB FOR SWITCH,GE658 (2)
18	3	23762	HARNESS,COIN DOOR
18	4	24818	LOCKING BAR, CASH BOX
18	4	12705	CASH BOX DIVIDER
18	4	22718	CASH BOX,PLASTIC
18	4	21608	CASH BOX LID
18	5	14935	MECHANICAL COIN COUNTER

STAT CARD ASSEMBLY
16957

FIG.#	ITEM #	PART #	DESCRIPTION
19	1	29138	P.C. BD,STAT CARD,COMPLETE
19	2	29210	HARNESS,STAT CARD
19	(not shown)	29262	BEZEL,STAT CARD
19	3	28104	RESISTOR,3.9K,1/4 WATT
19	4	24770	RESISTOR,22K,1/4 WATT
19	5	16991	RESISTOR,1K,1/4 WATT
19	6	30339	CAPACITOR,.1MFD,25V,MONO. (2)
19	7	22562	CAPACITOR,10MFD,25V,TANTALUM
19	8	17001	CAPACITOR,.01MFD,25V,MONO. (3)
19	9	35896	TRANSISTOR,POWER P-FET,IRFD 9010
19	10	12567	SOCKET,STAT CARD

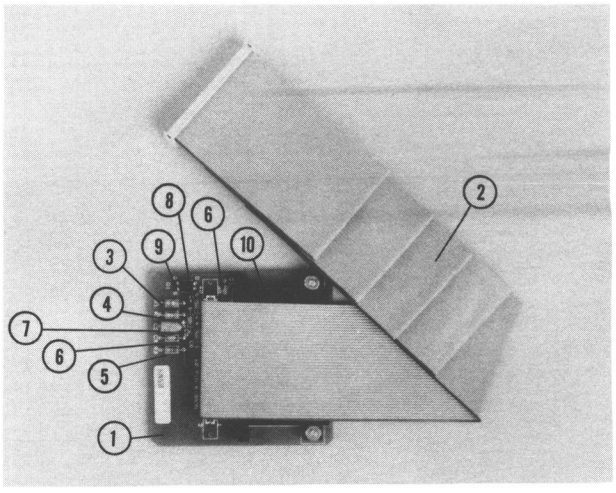


Figure 19

MAIN P.C. BOARD ASSEMBLY

25908

FIG.#	ITEM #	PART #	DESCRIPTION
20	1	26964	IC,SN74LSO4,INVERTER
20	2	29084	IC,SN74LS244
20	3	26984	IC,8749,TARGET SCAN PROGRAM
20	4	13637	IC,LM383T,AUDIO AMPLIFIER
20	5	21416	IC,MC7805,5V REG. TO-220,1 AMP
20	6	22526	IC,556,DUAL TIMER
20	7	24746	IC,6821,P.I.A. (3)
20	8	18079	IC,TMS4464,DYNAMIC RAM,16KX4 (2)
20	9	19089	IC,TMS9118,VIDEO
20	10	23638	IC,6809,MICROPROCESSOR
20	11	34761	IC,74LS74,DUAL D,FLIP FLOP
20	12	13653	IC,75176B,8 PIN BUS TRANSCEIVER
20	13	32541	IC,27C010,128K,EPROM,W/GAME PROGRAM
20	14	25872	IC,74LS245,TRI-STATE BUS TRANSCEIVER
20	15	13657	IC,74LS541,OCTAL BUFFER (2)
20	16	29104	IC,DS1244Y,BATTERY BACKED RAM W/CLOCK
20	17	30325	IC,MAX,4391
20	18	23654	IC,1990C.JED,PRG,20V8GAL,PROGRAMMED
20	19	31435	IC,DS1488N,MODEM DRIVER
20	20	32545	IC,DS1489AN,MODEM RECEIVER
20	21	33655	IC,SCN2681AC1N40,DUAL RECEIVER/TRANS
20	22	26988	RESISTOR,2.2 OHM,1/4W
20	23	29108	RESISTOR,100 OHM,1/4W (2)
20	24	34769	RESISTOR,220 OHM,1/4W
20	25	12551	RESISTOR,330 OHM,1/4W
20	26	16991	RESISTOR,1K OHM,1/4W (18)
20	27	22550	RESISTOR,10K OHM,1/4W (20)
20	28	11443	RESISTOR,680K OHM,1/4W
20	29	13663	RESISTOR,1 MEG OHM,1/4W (2)
20	30	19113	RESISTOR,10K OHM,POT
20	31	26992	RESISTOR,3.3K OHM,1/4W (4)
20	32	28102	RESISTOR,12K OHM,1/4W
20	33	34773	RESISTOR,75 OHM,1/4W
20	34	11445	RESISTOR,470 OHM,1/4W
20	35	12557	RESISTOR,750 OHM,1/4W (2)
20	36	23660	RESISTOR,18K OHM,1/4W
20	37	26990	RESISTOR,47K OHM,1/4W
20	38	30331	RESISTOR,100K OHM,1/4W
20	39	29112	RESISTOR,510K OHM,1/4W
20	40	13667	RESISTOR,75K OHM,1/4W
20	41	14777	RESISTOR,120K OHM,1/4W
20	42	19121	CAPACITOR,1MFD,25V,AXIAL,TANTALUM(2)
20	43	13669	CAPACITOR,100MFD,25V,AXIAL,ELECT.(2)
20	44	12559	CAPACITOR,47PF,25V
20	45	19119	CAPACITOR,1000MFD,25V,AXIAL,ELECT.(2)
20	46	15891	CAPACITOR,470PF,25V
20	47	32561	CAPACITOR,.1UF,200V,CERAMIC,AXIAL(42)
20	48	12563	CAPACITOR,4.7MFD,25V,TANTALUM (3)
20	49	13673	CAPACITOR,5PF,200V,AXIAL,CERAMIC(3)
20	50	14783	CAPACITOR,33PF,200V,AXIAL,CERAMIC(2)
20	51	15893	CAPACITOR,22PF,200V,AXIAL,CERAMIC
20	52	17003	CAPACITOR,.22MFD,16V,AXIAL,CERAMIC
20	53	18113	CAPACITOR,.33MFD,100V,AXIAL,CERAMIC(2)
20	54	19123	CAPACITOR,.47MFD,16V,AXIAL,CERAMIC
20	55	22562	CAPACITOR,10MF,25V.AXIAL
20	56	25892	CAPACITOR,390PF,50V (3)
20	57	27002	CAPACITOR NET,SIP,1000PF X 9, 50V(3)
20	58	21458	CRYSTAL,4 MHZ
20	59	22568	CRYSTAL,10.738635 MHZ,PAR.
20	60	24788	CRYSTAL,3.684 MHZ
20	61	33681	SWITCH,DIP,4 POSITION
20	62	11465	SWITCH,PUSH BUTTON,MOMENTARY,6MM (2)
20	63	33693	HEADER,POST,40 PIN,R/A,W/CLIPS
20	64	13695	CONNECTOR,11 PIN,R/A,.156 CENTERS
20	65	32585	CONNECTOR,POST HEADER,2,.156"
20	66	15917	JACK,PHONO,P.C.MOUNT
20	67	35574	CONNECTOR,MODULAR,4 PIN,RJ-11 (5)
20	68	23698	HEADER,12 PIN,.156 CENTERS
20	69	17031	LED,RED,AEG TIL 220(2)
20	70	17173	DIODE,IN4148 (2)
20	71	22732	TRANSISTOR,2N4400
20	72	23842	TRANSISTOR,2N4402
20	73	30513	TRANSISTOR NETWORK,ULN2003A (4)
20	74	21628	FERRITE,BEAD ON A LEAD,120 OHM Z=120 OHMS @ 100 MHZ (5)
20	75	26070	CHOKE,680 UH
20	not shown	23688	MODEM FOR GALAXY GAME

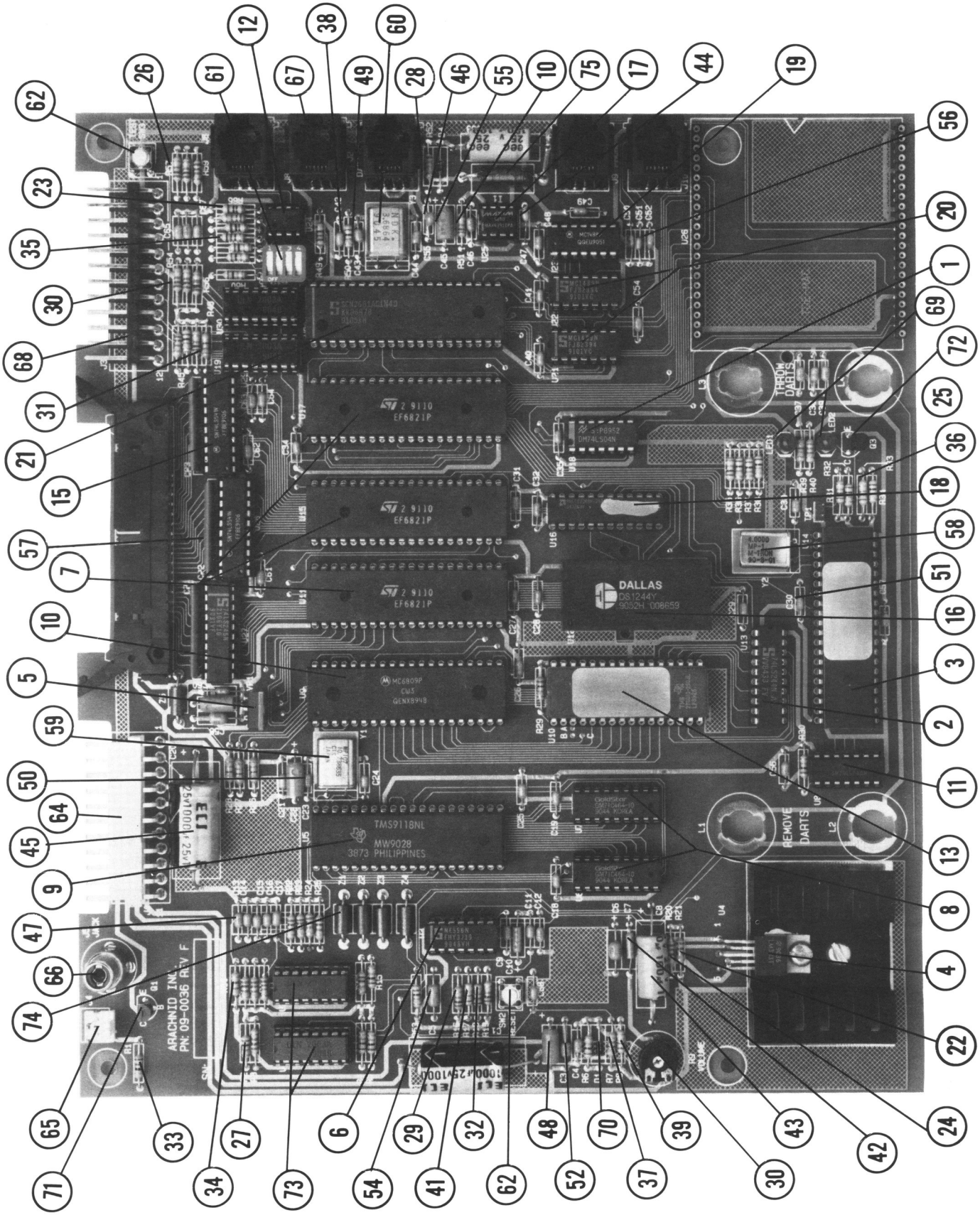


Figure 20: Main P.C.Board

MAIN CABINET ASSEMBLY

FIG.#	ITEM #	PART #	DESCRIPTION
21	1	18225	LOWER DECAL,GALAXY
21	1	14895	LOWER DECAL,TOWERS
21	2	23838	CABINET,LOWER,EMPTY
21	3	26058	CABINET,UPPER,EMPTY
21	4	27168	FRONT CABINET DOOR,EMPTY
21	5	11563	TOP DECAL
21	6	21564	BEZEL DECAL,MID-MOUNT
21	(not shown)	22684	COMPETITOR STRIP
21	8A	14893	DECAL,INSTRUCTIONS,USA
21	8B	26004	DECAL,ENTER/SELECT BUTTONS,USA
21	8C	24894	DECAL,ARACHNID,USA
21	8D	18225	DECAL,LOWER,GALAXY
21	9	23626	ARACHNID WEB ASSEMBLY
22	10	32565	SOCKET,LAMP,MEDIUM BASE (2)
22	11	19153	LAMP,120V,60WATT,STANDARD BULB (2)
22	12	11503 & 12613	REFLECTORS FOR LAMPS,RIGHT & LEFT
23	13	17049	LOCK, WITHOUT CAM (2)
23	13	21498	CAMS FOR LOCKS (2)
23	14	21462	SWITCH,ON/OFF ROCKER FOR LAMPS
23	15	19167	FUSE HOLDER,CHASSIS MOUNT
23	15	30349	FUSE,2.0AMP,250V SLOW BLOW
24	16	21484	SPEAKER
25	17	22652	MAIN HARNESS
25	18	13763	VIDEO HARNESS
25	19	33761	CABLE,PHONE (TI) 30"
25	20	19127	RECEPTACLE,CASED,3 PRONG
25	21	22610	HINGE,FRONT PANEL,160 DEG. SWING (2)
25	22	12593	MONITOR,12" COMPLETE
26	23	19131	SWITCH,ILLUMINATED W/O BULB (2)
26	24	34811	BULB,GE658 (2)
(NOT SHOWN)		34809	RCA SPLITTER 2 TO 1 (FOR 2 MONITORS)

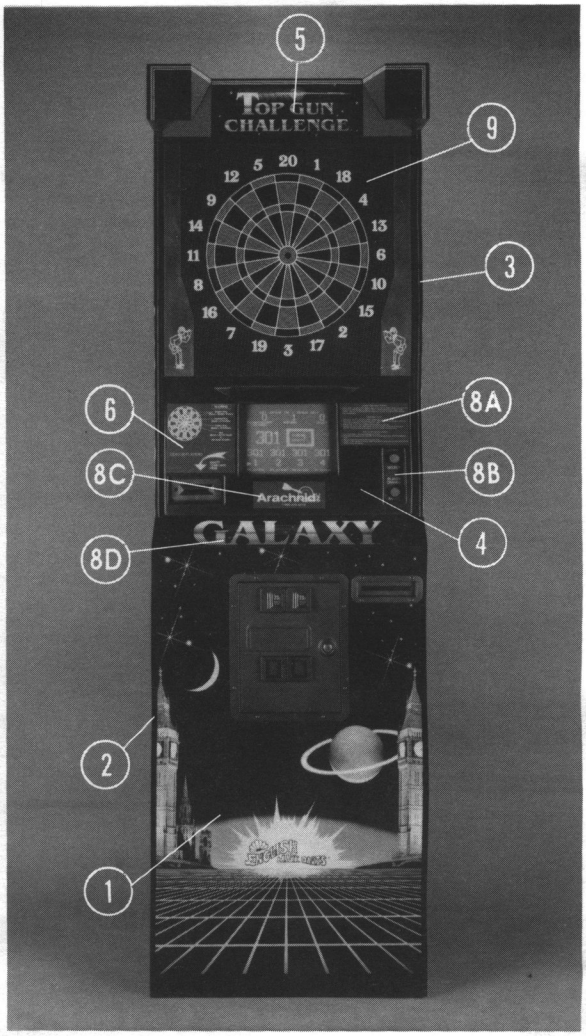
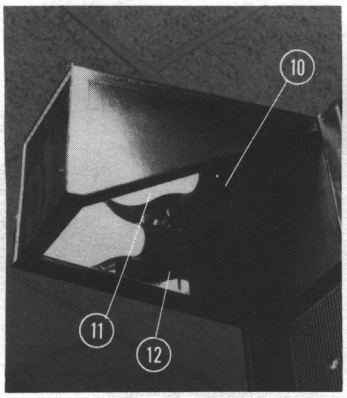


Figure 21



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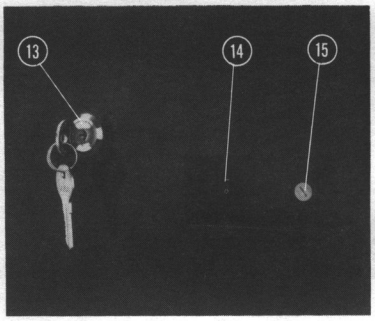
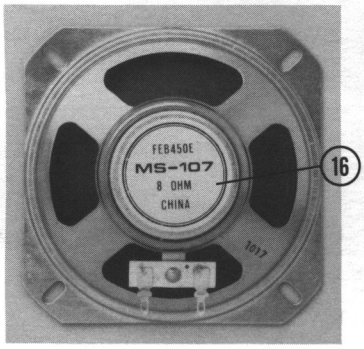


Figure 23

— NOTE —

THE PART NUMBERS LISTED ARE THE ARACHNID PART NUMBERS. PLEASE USE THESE NUMBERS WHEN PLACING YOUR ORDER. SOME DESCRIPTIONS ARE FOLLOWED BY A NUMBER IN PARENTHESES. THIS NUMBER IS THE QUANTITY USED IN THAT ASSEMBLY.



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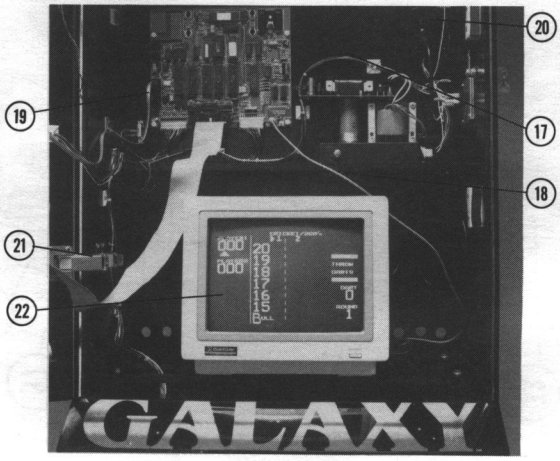

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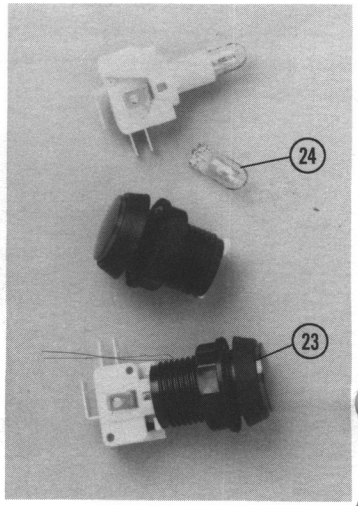


Figure 26

POWER SUPPLY CHASSIS ASSEMBLY

31407 (110V VERSION)

FIG.#	ITEM #	PART #	DESCRIPTION
27	1	28118	FUSE,5A,250V,SLOW BLOW
27	1	25922	FUSE CLIPS,P.C. MOUNT (2)
27	2	18077	REGULATOR,5V - LM323K
27	2	19171	HEAT SINK TO3 ,#5684
27	3	28078	REGULATOR,12V,LM 340-12,TO-220
27	3	13705	HEAT SINK,#6072B
27	4	28144	HEAT SINK,SQUARE
27	4	33843	BRIDGE RECTIFIER,8A,200PIV
27	5	18107	RESISTOR,5 OHM,40W
27	6	27022	CONNECTOR,10 PIN
27	7	26996	CAPACITOR,.33MFD,100V (2)
27	8	21448	CAPACITOR,4.7MF,25V,TANTALUM (2)
27	9	30343	CAPACITOR,2200MFD,35V,ELECT,RADIAL
28	10	13849	TRANSFORMER,100V PRIMARY
28	10	34957	TRANSFORMER,115V PRIMARY
28	10	12739	TRANSFORMER,230V PRIMARY
28	11	15961	POWER CORD,12',USA
28	11	25974	POWER CORD,10',FRENCH/GERMAN
28	11	27084	POWER CORD,10',ENGLAND
28	12	22558	CAPACITOR,8900 MFD,25V
28	13	28128	PRINTED CIRCUIT BOARD ASSY,TOP
28	14	35587	CHASSIS,POWER SUPPLY
29	15	11473	CONNECTOR,6 PIN,CHASSIS MOUNT
29	16	22594	STRAIN RELIEF
29	17	19133	SWITCH,ON/OFF,ROCKER,SQUARE
29	18	19167	FUSE HOLDER,CHASSIS MOUNT
29	18	30349	FUSE,2.0A,250V,SLOW BLOW
29	19	24774	POTENTIOMETER,1 MEG OHM
30	20	12527	IC,MOC3030,OPTO ISOLATOR
30	21	30329	RESISTOR,120 OHM,1/4 W
30	22	31441	RESISTOR,180K OHM,1/4 W
30	23	16991	RESISTOR,1K,1/4 W
30	24	32559	CAPACITOR,.1MF,600V,DISK
30	25	31453	CAPACITOR, 1 UFD,400V (UNDERNEATH)
30	26	23668	CAPACITOR,.02 MFD,600V (2)
30	27	26062	VARISTOR,V150LA20A (110V UNITS)
30	27	12735	VARISTOR,V250LA20A (220V UNITS)
30	28	27172	TRIAC,SC-146D (UNDERNEATH)
30	29	13845	MBS4991,BI-DIRECTIONAL SWITCH
30	30	11629	INDUCTOR,50MH,3 AMP
30	31	32449	PRINTED CIRCUIT BOARD ASSY,BOTTOM
30	31	18005	PRINTED CIRCUIT BOARD ASSY,230V

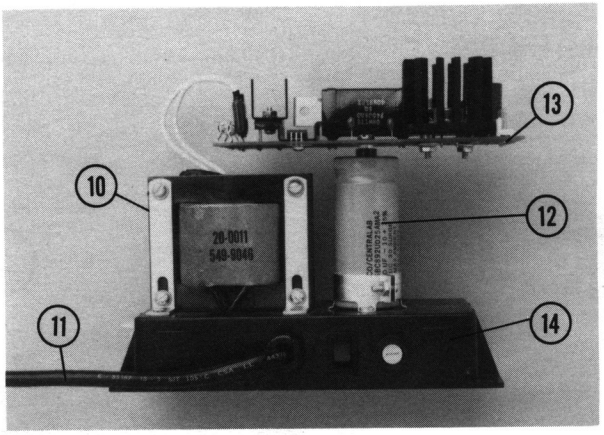


Figure 28

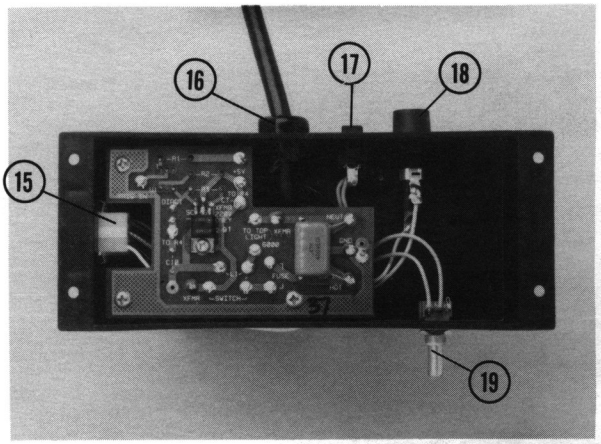
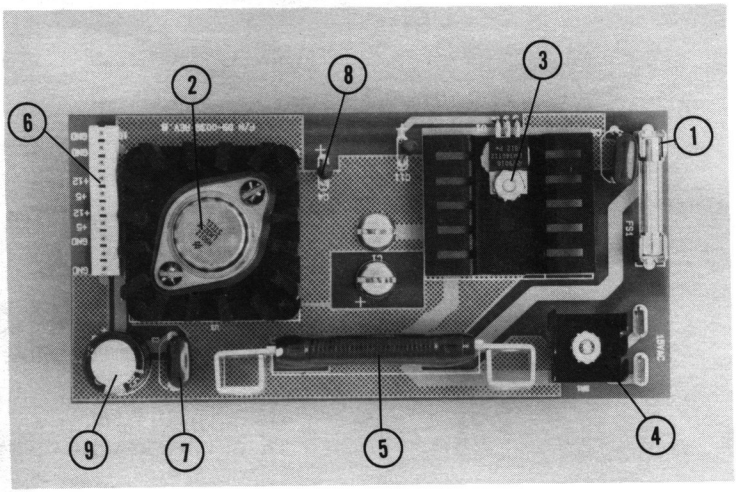


Figure 29



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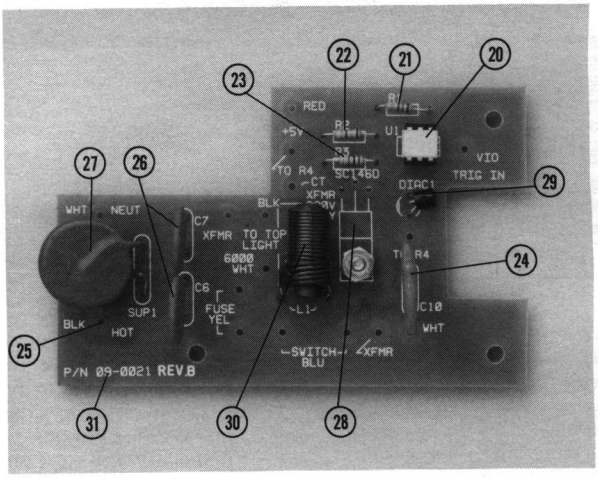

Figure 30

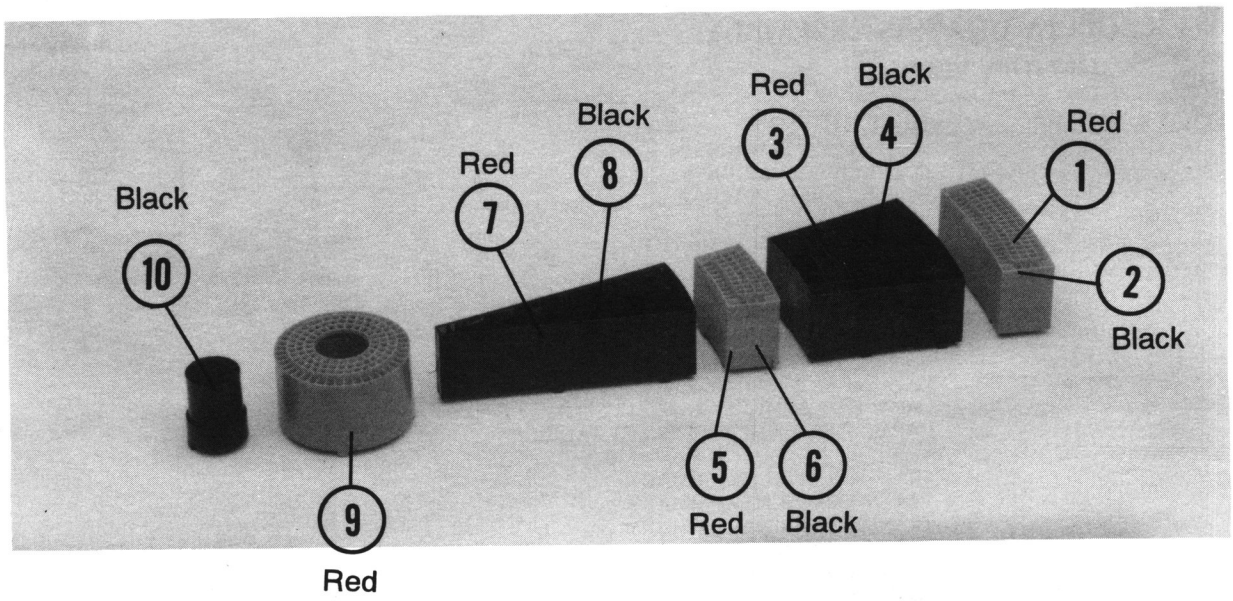

Figure 31

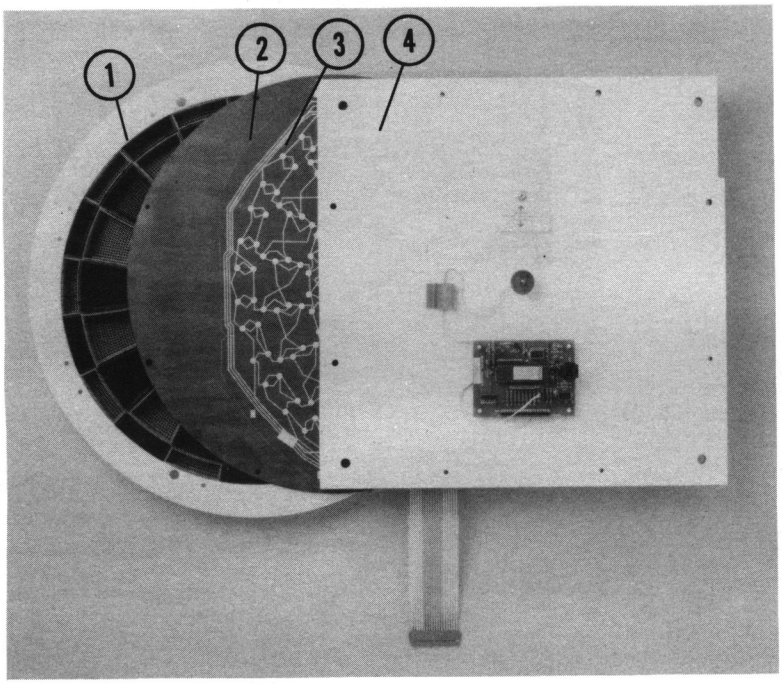

Figure 32

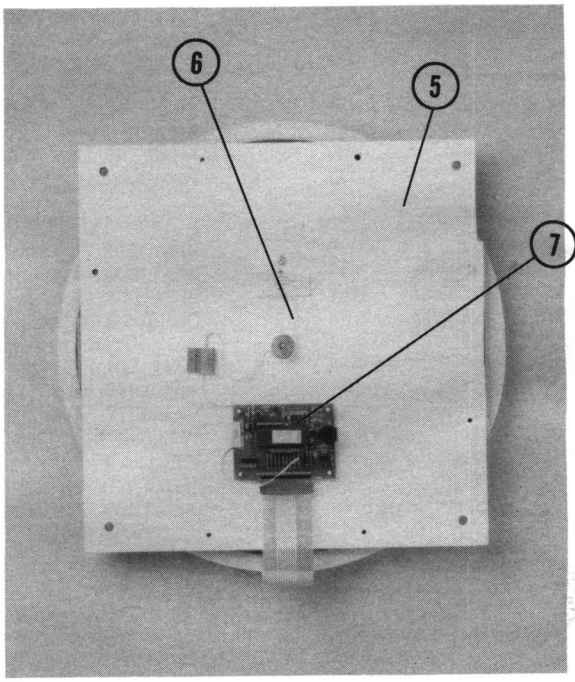

Figure 33

DARTHEAD SEGMENTS

FIG.#	ITEM #	PART #	DESCRIPTION
31	1	18069	A-SEGMENT,RED,DOUBLE
31	2	19079	A-SEGMENT,BLACK,DOUBLE
31	3	21408	C-SEGMENT,RED,SINGLE
31	4	22518	C-SEGMENT,BLACK,SINGLE
31	5	23628	D-SEGMENT,RED,TRIPLE
31	6	24738	D-SEGMENT,BLACK,TRIPLE
31	7	25848	E-SEGMENT,RED,PIE SINGLE
31	8	26958	E-SEGMENT,BLACK,PIE SINGLE
(NOT SHOWN)		28068	B-SEGMENT,RED BULLSEYE
31	9	29078	B-SEGMENT,D/BULL,OUTER,RED
31	10	30299	B-SEGMENT,D/BULL,INNER,BLACK
(NOT SHOWN)		35845	DOUBLE BULL SPRING

DARTHEAD ASSEMBLY

FIG.#	ITEM #	PART #	DESCRIPTION
32	1	29268	SPIDER W/O SEGMENTS
32	2	28258	MATRIX CUSHION,SUP. SPIDER
32	3	12575	SWITCH MATRIX,SUP. SPIDER
32	4	19273	TARGET BACK,SUPER SPIDER
33	5	31409	COMPLETE DARTHEAD
33	5	13631	DOUBLE BULL DARTHEAD
33	6	33627	MISSED DART DETECTOR
33	7	24798	TARGET INTERFACE,GALAXY

SECTION 7 - TROUBLESHOOTING GUIDE

WARNING - UNPLUG POWER TO GAME BEFORE WORKING ON MACHINE

PROBLEM	PROBABLE CAUSE	PROCEDURE
Nothing lit on game	A. Blown main fuse	A. Replace fuse on back of power supply with a 2.0 Amp 250v slow blow fuse
	B. No power at outlet	B. Check Main breaker in building
	C. Fuse FS1 on top of power supply is blown	C. Replace fuse with a 5 Amp 250V slow blow
	D. 5 volt regulator is bad	D. Check for +15V on the input to the regulator and +5V on the output. If input is OK but +5V is not present, replace 5V regulator - LM323K
	E. Game not turned on	E. Turn on switch located on back of power supply (behind game)
Player change and/or game select switches not functioning	A. Bad U11 (6821)	A. Replace U11
	B. Broken connection from P.C. board to switches	B. Check and repair wire harness
Coin switch(es) not functioning	A. If both are not working, may be a bad ground to the coin switches	A. Repair ground. **NOTE** - system ground is floating (not connected to power supply chassis) and is connected only to the P.C. board on top of the power supply
	B. If one switch isn't working, check U11 or U17 (6821's)	B. Swap U11 with U17, if problem changes, one of the IC's are bad
	C. If just one switch isn't working, check U1 or U2	C. Swap U1 or U2 with U19, if problem changes, replace the bad ULN2003
Target lamps won't light at all	A. Bulb burned out	A. Replace bulb(s) - standard 60 watt
	B. If game also is not working, fuse FS1 is blown	B. Replace FS1 (5Amp, 250V slow blow)
	C. If coin lights are lit but monitor doesn't come up, the fuse on the side of the game is blown, or side switch is turned off	C. Make sure the side switch is turned on. If it is, check fuse mounted next to it, and replace with a 2Amp, 250V slow blow

SECTION 7 - TROUBLESHOOTING (cont.)

WARNING - UNPLUG POWER TO GAME BEFORE WORKING ON MACHINE

PROBLEM	PROBABLE CAUSE	PROCEDURE
Sound problems	A. 12V regulator (LM340-12) on power supply is faulty or fuse FS1 is blown	A. Check for +15V on pin 1 and +12V on pin 3. If +12v is not present, replace regulator. If +15V is zero, replace fuse (FS1 on power supply) with a 5 Amp, 250V slow blow; or check wiring from power supply to Main Board
	B. Amplifier faulty (U4, LM383T) on Main Board	B. Check input (pin 1) with an oscilloscope to see if square waves are coming in during a sound (make sure volume is turned up). If no square wave is present, see "C" below. If square waves are present at pin 1 but not at pin 4, replace U17
	C. Bad P.I.A. U17 (6821)	C. If no square wave is present on pin 19 of U17 (during the time sound is supposed to be present), replace U17
	D. Sound sticks on; game must be shut off to stop it	D. Replace capacitor C2 on the Main Board. If this doesn't work, replace capacitor C11 on the power supply
No score	A. Dirt or broken tips in darthead holding a switch in the matrix closed (game won't score until switch in the matrix is open)	A. Try to remove the foreign material with a pliers or tweezers. If material can't be removed this way, clean darthead ass'y by taking it apart, removing any broken pieces, cleaning it thoroughly, and reassembling. Be sure to line layers up properly before reinstalling
Select or Player Change lamps not functioning	A. Lamp burned out	A. Replace with GE658 (do not use a GE194 or GE161 lamp)
	B. Driver for lamp is bad	B. Replace U19 (ULN2003)
	C. P.I.A. (6821) is bad	C. Replace P.I.A. (U11)
	D. Check the LM340-12 for +12V. Also check for proper lamps (GE658 only)	D. Turn off the power supply, and let it cool. If they come on after cooling, then the lamps may be too high wattage. Be sure that the bulbs are GE658. Replace LM340-12 on power supply if necessary

SECTION 7 - TROUBLESHOOTING (cont.)

WARNING - UNPLUG POWER TO GAME BEFORE WORKING ON MACHINE

PROBLEM	PROBABLE CAUSE	PROCEDURE
Garbage on Top Gun list, Spider Writer screens, or Popularity screens	A. Service person has touched Main Board or wiring going to Main Board while charged with static - or static has entered in some other way	A. Clear the screens with garbage according to Test/Setup Mode instructions. Service person should touch the coin door front to discharge static before touching electronics in the game
	B. Battery in DS1244 static RAM is bad	B. Batteries inside device are not replaceable - replace static RAM (IC U12)
	C. Game not properly grounded	C. The 3 prong plug on game and wall outlet must be properly grounded
No video display	A. No 110VAC to monitor	A. Check on/off switch on the side of the game. Check the fuse next to the switch (2A, 250V slow blow). NOTE: the target lamps will also not work if this fuse is blown. Check switch on front of the monitor itself. Check the fuse on front of monitor board and replace if necessary (3/4 Amp, 250V slow blow)
	B. Transistor Q1 (or TMS9118) bad on Main P.C. Board	B. With an oscilloscope, check the output of the TMS9118(U5) for approx. 1 to 1 1/2V P-P video signal. Then check for same at the center connector of the video jack. If not present at the jack, replace Q1 (2N4400). Q1 is used as a buffer for the TMS9118 for protection against accidental shorting. If signal is not present at TMS9118(U5) output, replace it instead of Q1
Garbage on display	A. Video Memory(s) bad	A. Replace U6 and/or U7, TMS4464
	B. Video chip is bad	B. Replace U5, TMS9118
	C. Static RAM chip is bad	C. Replace U12, DS1244
Skipping darts or free dart sound going off randomly	A. Contacts dirty on missed dart detector	A. Clean contacts with a soft cloth; use some Isopropyl Alcohol if necessary
	B. Sensitivity is set too high	B. Slide the sensitivity bar down a little
	C. Contacts out of alignment	C. Slide the plastic that suspends the outer contact back and forth until both contacts are centered with each other

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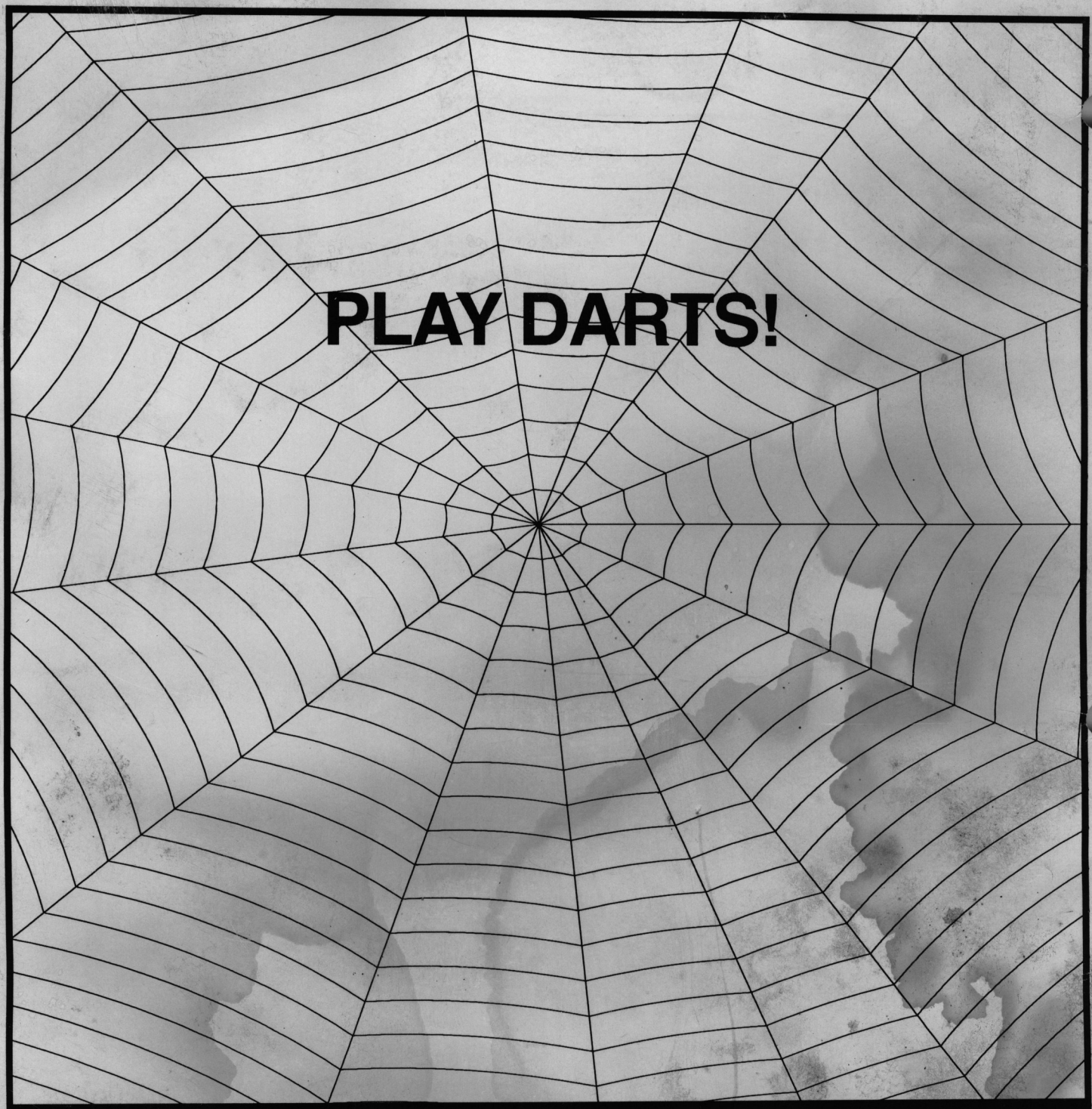

WARNING: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. NOTE: Proper grounding through power cord is necessary for compliance.

Arachnid, Inc.
The Originator of Electronic Darts

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